FOOD MANUFACTURE

Incorporating Food Industries Weekly

ONARD HILL LIMITED, STRATFORD HOUSE, 9 EDEN STREET, LONDON, N.W.1 AUGUST 1, 1955

Department Food Technology
University of Massachusetts

Enquiries for other sizes and with alternative mesh welcomed.

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Exceptionally strong and light — suitable for a wide range of purposes. The type illustrated is 34" long, 18" wide and 2½" deep (all inside dimensions) with an outer frame and supports of corrosion resisting aluminium alloy, and steel wire mesh (6 squares per inch) for the base.

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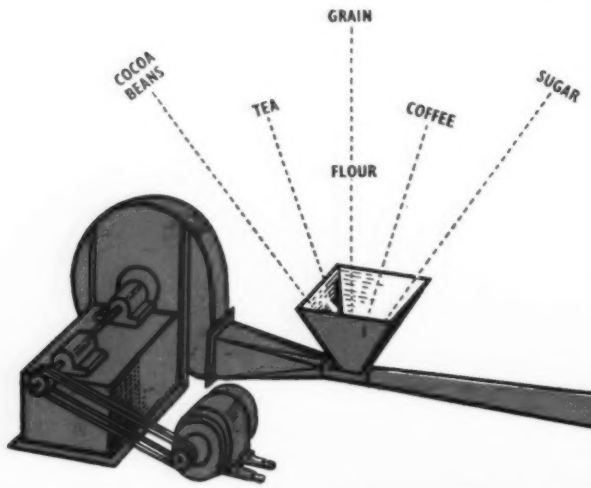

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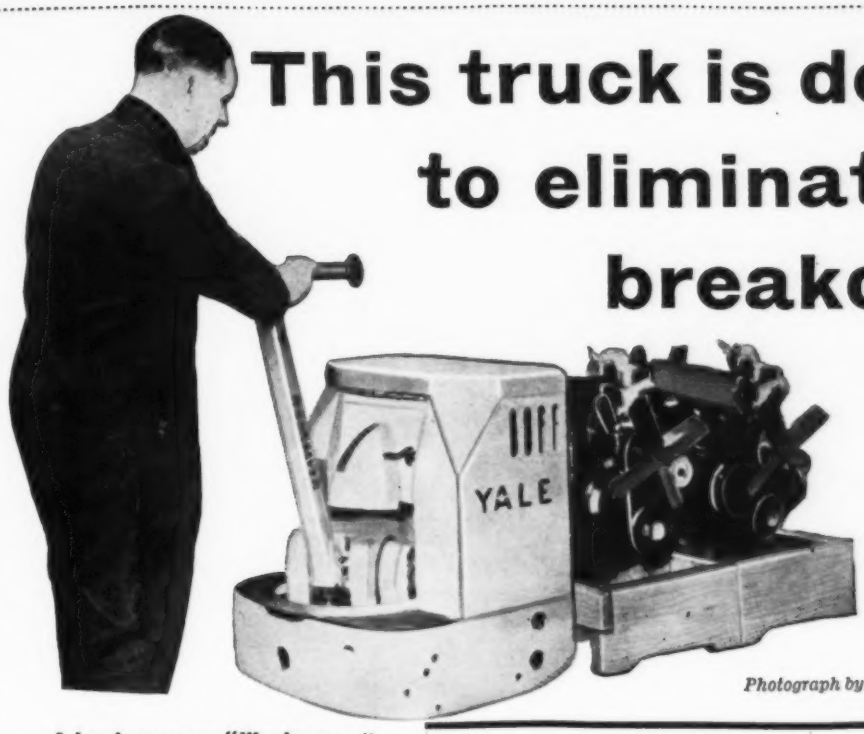
This truck is designed to eliminate breakdowns

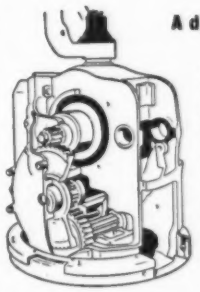


Photograph by courtesy of Humber Ltd., Coventry

A load on your "Worksaver" is a load off your mind!

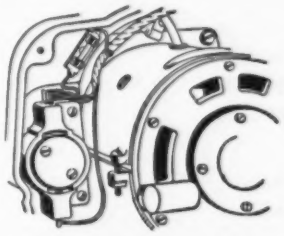
When mechanical handling equipment lies idle—waiting for attention or spares—production costs *shoot* up. Invest in a "Worksaver"; put it to work and compare its trouble-free service with any of your other trucks. Then you'll understand why so many plants—large and small—are changing to Yale.

The "Worksaver" is available in Fork Lift, Pallet, Platform and Tractor models.



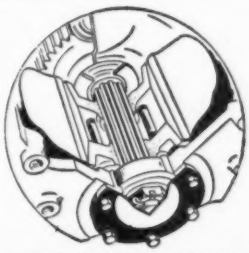
A drive unit that lasts a lifetime

This powerful, robust drive unit will stand up to a lifetime of rough handling. Gears are drop-forged nickel-chrome-molybdenum steel, heat-treated and mounted on ball bearings, operating in oil. Entire drive unit is enclosed and floats on 105 ball bearings.



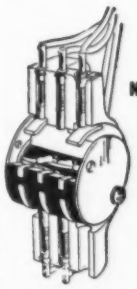
Simple to change brushes

Drive motor of a high torque series wound type, specially designed for easy cleaning and adjustment.



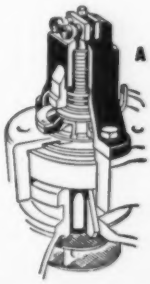
Split hub eliminates pressing in tyres

Worn-out tyres can be quickly replaced by using hand tools—an exclusive Yale feature.



No frayed, broken wires

On the "Worksaver", all flexing, chafing and bending of wires is eliminated. Slip rings are built into the base of the handle so that wiring cannot be twisted or bent, no matter how the handle is turned or lifted.

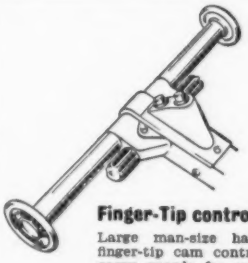


A capstan built to take the load and more

The load-carrying tapered roller bearing ensures perfect alignment of the unit. The power line is carried through silver contacts. Wires cannot bend whatever the angle of the turn.

Fully protected—easily accessible

The head and heart of the "Worksaver" is fully protected, yet easily accessible for adjustments and inspection. It can be removed from the truck in five minutes.



Finger-Tip control

Large man-size handles with finger-tip cam controls. Ends carry guards for safety. Two speeds forward and two reverse. Lift control and horn button in easy finger-reach position.

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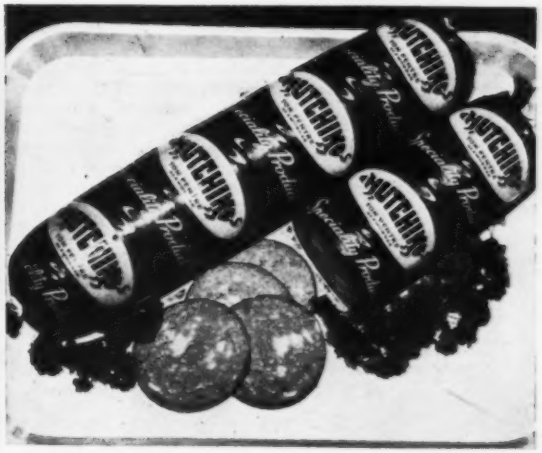

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SEEN *because DIOphane cellulose film is 95% transparent—more so even than window glass which is normally about 90% transparent. Your customers can carefully examine your product yet it remains as fresh and clean as when it left your factory.*

Diophane means Buy Again

and because your sales increase DIOphane pays for itself!

TYPES OF DIOPHANE

CODE	TYPE OF FILM	PROPERTIES	SUITABLE FOR	SEALING METHOD
P.T.	Plain (non-moisture-proof) Transparent	Transparent, proof against dust, air, oil, grease and handling	General wrapping including cereals—rice, tapioca, macaroni, etc. and foodstuffs requiring permeable wrapping: soap, cosmetics, bottles toys, textiles and paperware	Gum or gummed label Cellulose tape Wire staple Metal strip
P.C	Plain (non-moisture-proof) Coloured	As above, but coloured		
M.T.	Moistureproof Transparent	All properties of P.T. film, but also impervious to moisture vapour	Products needing protection against moisture or loss of moisture including biscuits, confectionery, cakes pharmaceuticals, cigarettes, dried fruits and metal parts	Special gum or gummed label Cellulose tape Wire staple Metal strip
M.C.	Moistureproof coloured	As above, but coloured		
M.T.T.W	Moistureproof Transparent Twistwrap	As M.T. film, but with greater flexibility	Twist wrapping confectionery	Twistwrapping by machine
M.S.T.	Moistureproof Heatsealing Transparent	As M.T. film, but can be heatsealed	Same products as listed under M.T. film. Sometimes unsuitable for products which require to be wrapped when hot	Special gum or gummed label Cellulose tape Wire staple Metal strip Heatsealing
M.S.C.	Moistureproof Heatsealing Coloured	As above, but coloured		
M.S.A.T.	Moistureproof Heatsealing Anchored Transparent (waterproof)	Transparent, waterproof and heatsealing, the waterproof coating being anchored to the base film	Syrupy and sticky products such as dates and table jellies and those likely to be in contact with water such as quick-frozen products	
L.S.A.T.	Lacquered Sealing Anchored Transparent	Transparent and heatsealing. Coated on both sides with a lacquer (semi-permeable to moisture vapour) anchored to the base film	Cakes, sausages, bacon, green vegetables, fresh fruits, and any products that require to breathe	

SPECIAL TYPES OF DIOPHANE CAN ALSO BE MADE FOR SPECIFIC REQUIREMENTS

SEND US YOUR ENQUIRIES; ASK FOR MORE DETAILS; WRITE OR PHONE TODAY.

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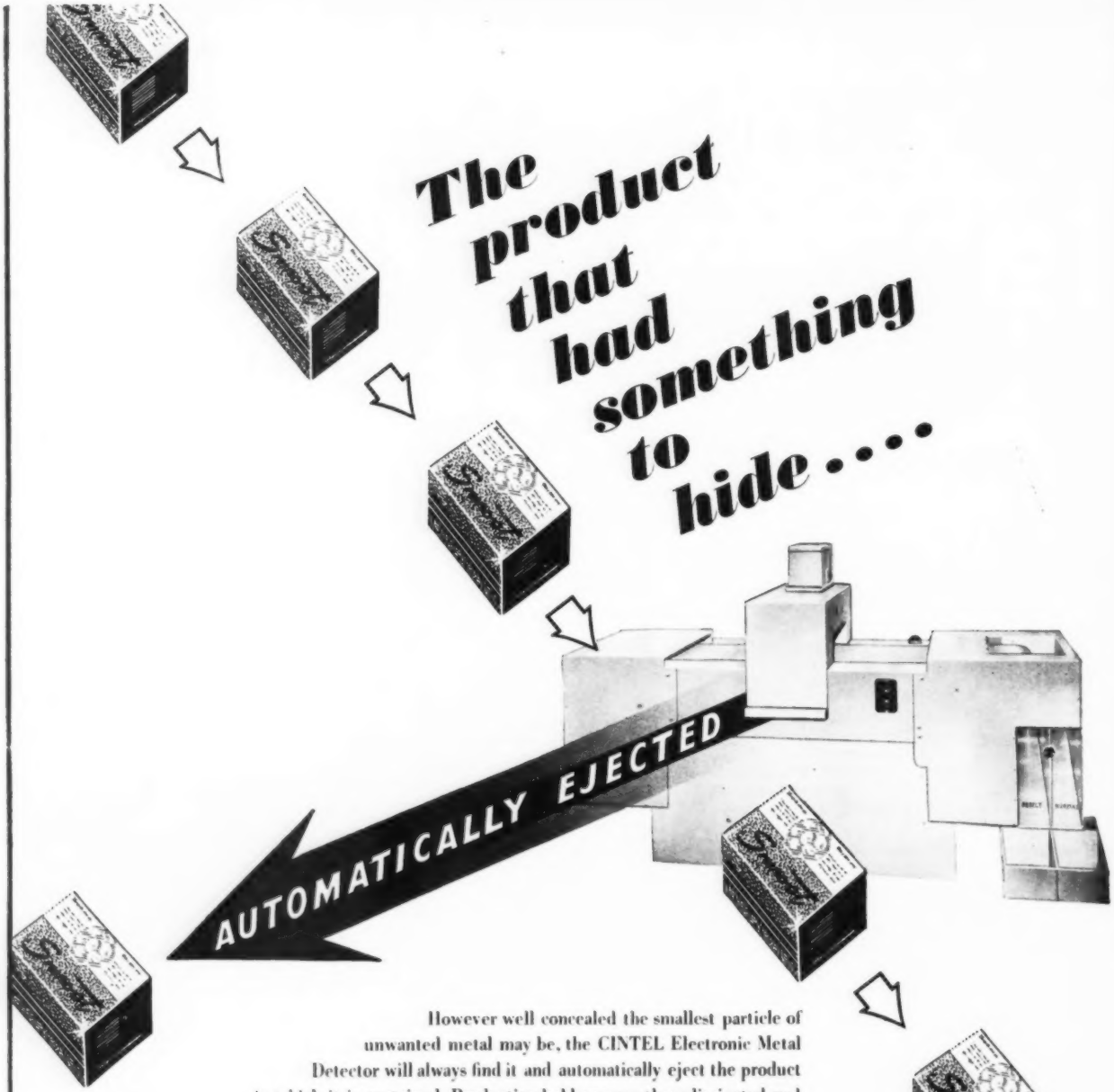

However well concealed the smallest particle of unwanted metal may be, the CINTEL Electronic Metal Detector will always find it and automatically eject the product in which it is contained. Production hold-ups are thus eliminated and your customer goodwill preserved. Full details are available to you on request.

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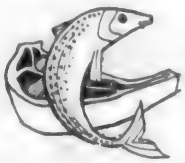
Lactic Acid

Lactic Acid is valuable to the manufacturers of tinned and bottled fruits, jams and sweet preserves because it improves the decolourisation, enhances the natural flavours and gives resistance to moulds. Lactic Acid plays a useful part in making pickles and similar preserves where it mitigates decolourisation of the vegetables. In many food processing operations and in storage the prevention of bacterial spoilage by provision of low pH is necessary. Where the natural flavour and colour of the products is to be maintained, and mild and pleasant acidity is to be introduced, Lactic Acid is very useful.

APPLICATIONS



FISH & MEAT PASTES

Lactic acid in a solid compound is a good preservative, and it conserves the fresh flavour of fish and meat.

INFANT FOODS

Lactic acid assists toleration of the greater fat content of cows' milk, stimulates gastric and intestinal digestion, and improves the digestibility of the curd. It improves the keeping qualities of the product, particularly in hot countries.

MARMALADE & JAMS

Mild acidulation for fine flavours. Gives a slower rate of gelling thus eliminating air bubbles. Useful in the extraction of pectin from apples and other pomaces.

JUNKET

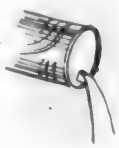
Calcium lactate corrects the tendency to lose setting power on heating.

MAYONNAISES & SALAD CREAMS

Improves emulsification and gives a smoother taste than other acids. Good preservative action and rancidity retardation of salad oils.

PICKLES

Improves colour, taste and preservation of vegetables.



SALT

Calcium lactate and magnesium lactate improve flow and prevent caking.

GENERAL

Lactic acid can be used as a direct additive and acidulating agent for foodstuffs; as a flavouring agent, and for fermentation and pH control.

Test supplies of Lactic Acid are freely available to food manufacturers

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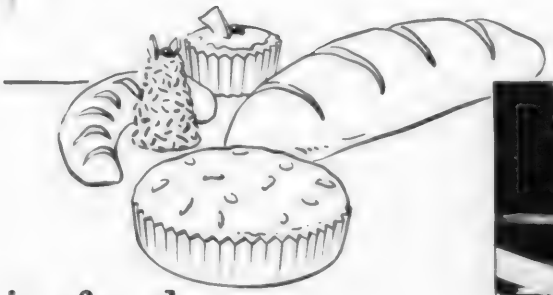

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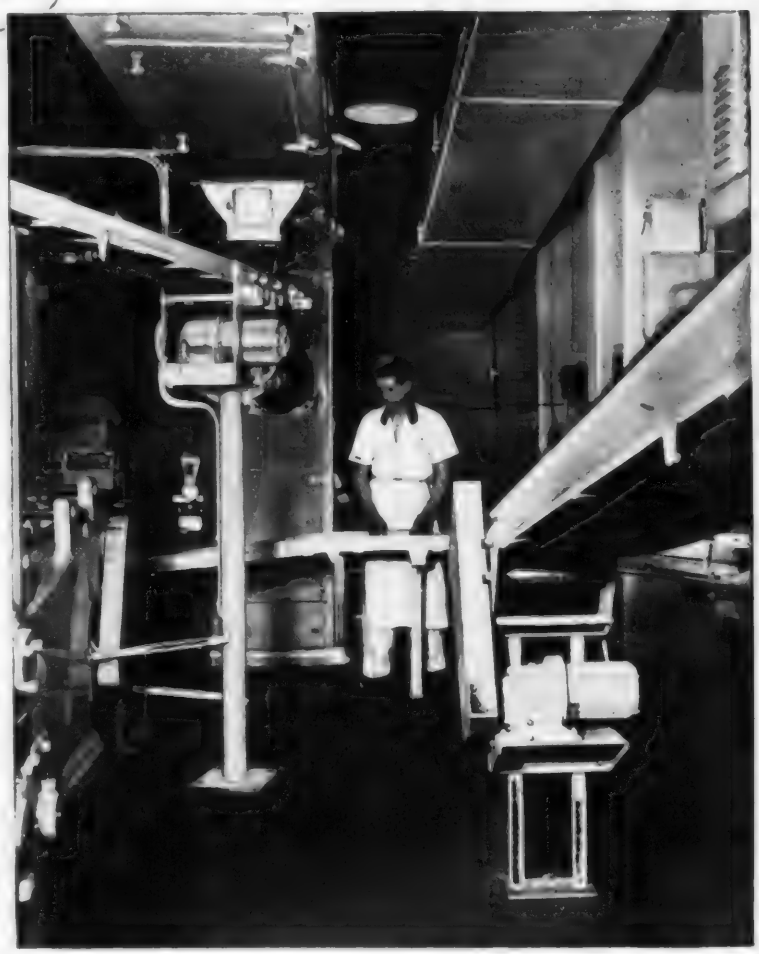

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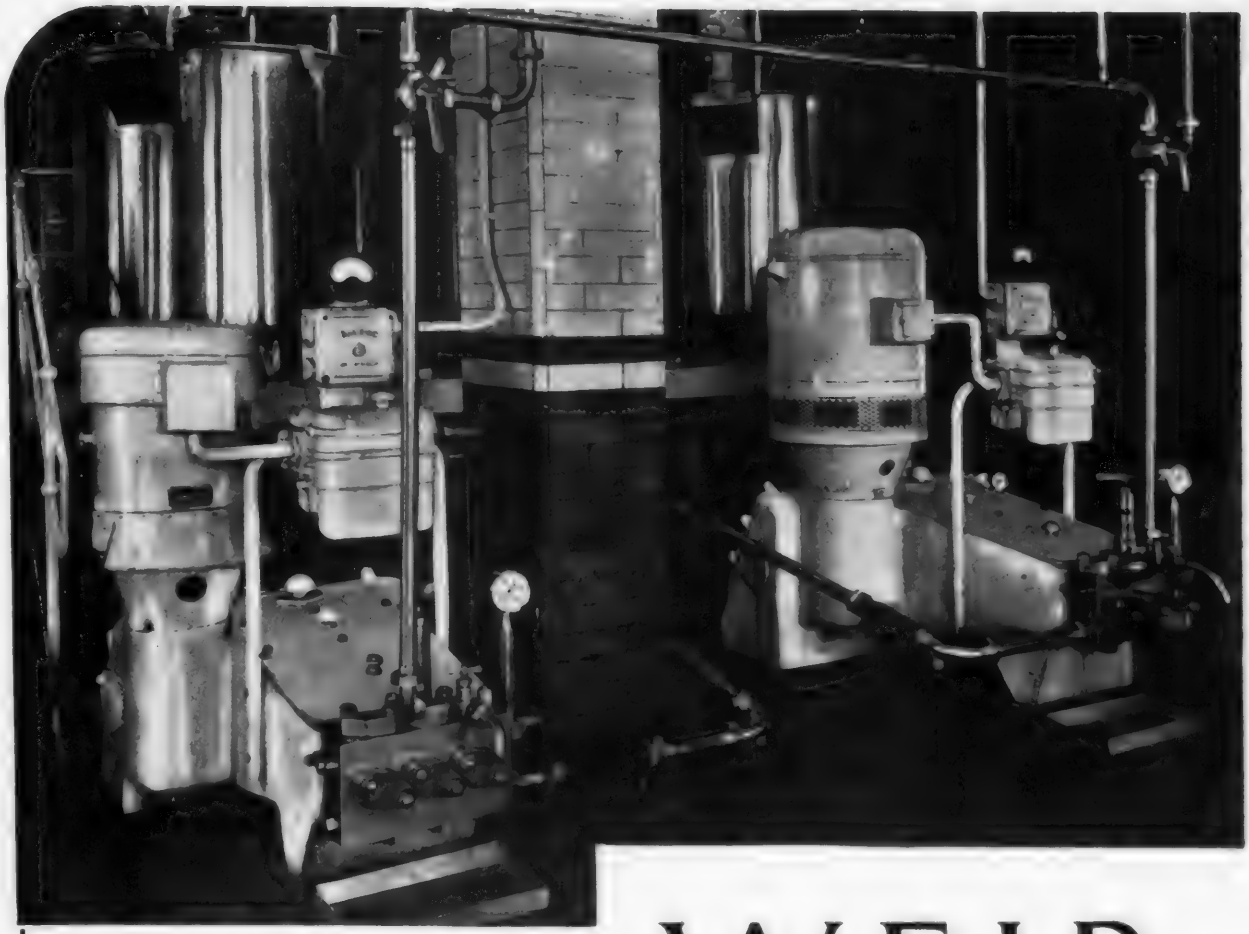

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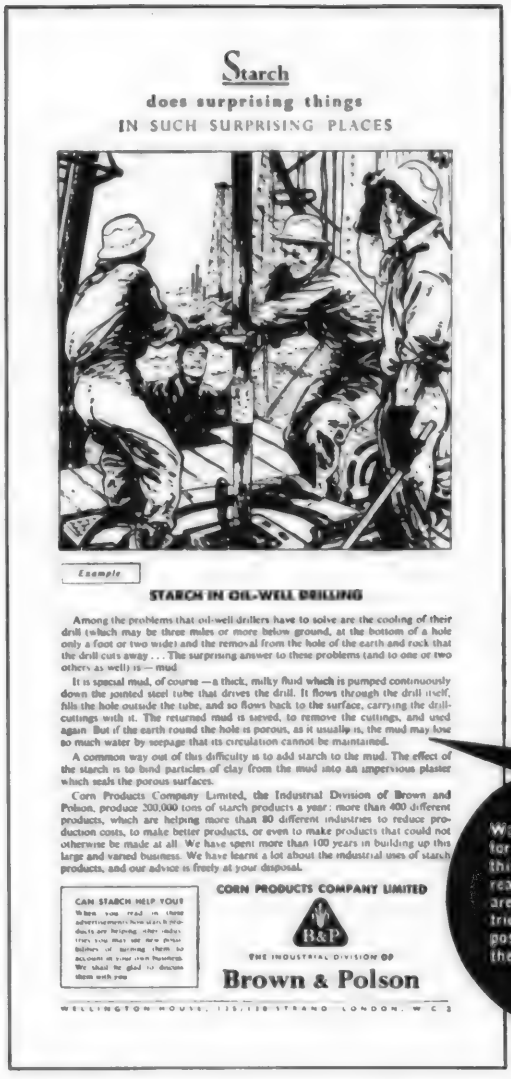
The deep knowledge and wide practical experience we have gained by our huge and varied production for other industries is your guarantee that our starch products for the preserving industry will always be the best that can be made. And we can promise you knowledgeable and disinterested advice whenever you care to discuss with us proposed new uses for starch products in your business.



Starch
does surprising things
IN SUCH SURPRISING PLACES

Example

STARCH IN OIL-WELL DRILLING

Among the problems that oil-well drillers have to solve are the cooling of their drill (which may be three miles or more below ground, at the bottom of a hole only a foot or two wide) and the removal from the hole of the earth and rock that the drill cuts away . . The surprising answer to these problems (and to one or two others as well) is — mud.

It is special mud, of course — a thick, milky fluid which is pumped continuously down the jointed steel tube that drives the drill. It flows through the drill itself, fills the hole outside the tube, and so flows back to the surface, carrying the drill-cuttings with it. The returned mud is sieved, to remove the cuttings, and used again. But if the earth round the hole is porous, as it usually is, the mud may lose so much water by seepage that its circulation cannot be maintained.

A common way out of this difficulty is to add starch to the mud. The effect of the starch is to bind particles of clay from the mud into an impervious plaster which seals the porous surfaces.

Corn Products Company Limited, the Industrial Division of Brown and Polson, produce 200,000 tons of starch products a year: more than 400 different products, which are helping more than 80 different industries to reduce production costs, to make better products, or even to make products that could not otherwise be made at all. We have spent more than 100 years in building up this large and varied business. We have learnt a lot about the industrial uses of starch products, and our advice is freely at your disposal.

CAN STARCH HELP YOU?
When you read in these advertisements how starch products are helping other industries you may see new possibilities of turning them to account in your own business. We shall be glad to discuss them with you.

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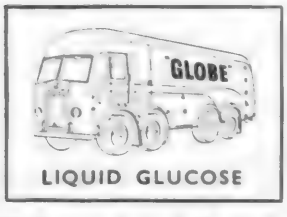
Watch the National press for advertisements like this one. When you read how starch products are helping other industries you may see new possibilities of turning them to account in your own business.

for you, in the Preserving Industry

Most jam manufacturers have encountered the problem of making jams that contain enough soluble solids to be satisfactory in quality, yet are not too sweet for their customers' taste and will not crystallise in storage. Most jam manufacturers are also aware that the best answer to this problem is to use less cane or beet sugar (sucrose) in their jams and make up the required soluble solids content with "Globe" liquid glucose. Glucose provides abundant food energy but is not as sweet as sucrose. When glucose is used in jam making to replace some of the sucrose it reduces excessive sweetness without reducing food value; it brings out the natural flavour of the fruit; it helps the jam to set; and it prevents crystallisation.

"Globe" liquid glucose is made from starch by Corn Products Company Limited—the Industrial Division of Brown & Polson—and we make the starch, too. Our careful control of every manufacturing process from the grain to the finished product is your assurance of the quality and purity you require in your preserves.



CORN PRODUCTS COMPANY LIMITED
THE INDUSTRIAL DIVISION OF B&P Brown & Polson

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GREAT-GRANDFATHER SPEAKS HIS MIND

"I can't stand my meat overcooked, m'boy"

Great-Grandfather believed in a bit of red blood in his food, his expressions, and his attitude to his work.

PROCEEDING, GREAT-GRANDFATHER SAID:

"A bit of beef overdried or a ham overboiled is just as spoiled as one of my products would have been if I'd given it too much heat.

"In my day we used to have men standing by our control valves to keep an eye on the temperature and the quality of the product. Men were cheap then.

"You don't know how lucky you are to have all these automatic temperature controls to choose from. If they'd been available in my day, m'boy, I'd have had one on every unit.

"My men were not all that reliable, even though they had everything to lose by making a slip. Now that your labour has a much better intelligence I don't see how you can possibly afford to use it for twiddling a valve, when that job can be done cheaply and better by Sarco."

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Please send details of Sarco Temperature Controllers.

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JACOB'S (L'POOL) LTD.

UNNECESSARY FATIGUE and loss of production were caused by radiant heat and excessively high air temperatures in the Wafer Department at W. & R. Jacob & Co. (L'pool) Ltd. Colts were consulted and a detailed ventilation survey proved that whilst more than sufficient extract ventilation already existed, this was unable to function properly owing to inadequate inlet air supplies. Five Colt Inflow Units were recommended as these would supply the inlet air necessary whilst at the same time the main cooling effects of the air movement provided would off-set the discomfort caused by radiant heat.

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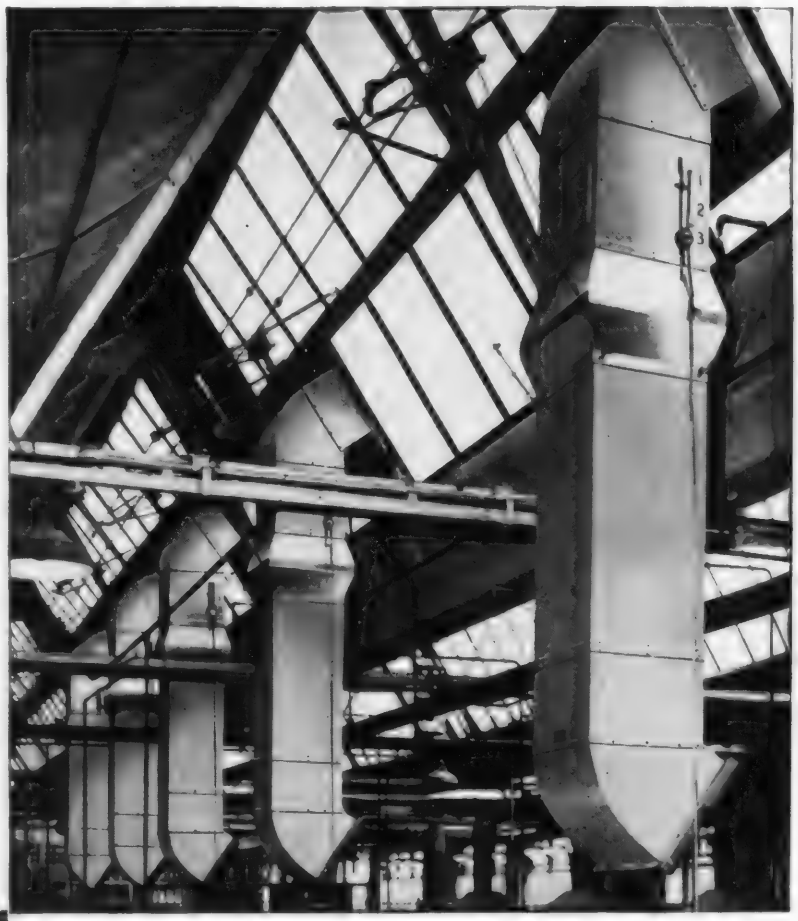

FREE MANUAL with full specifications of the wide range of Colt Ventilators is available on request from Dept. S39/267.

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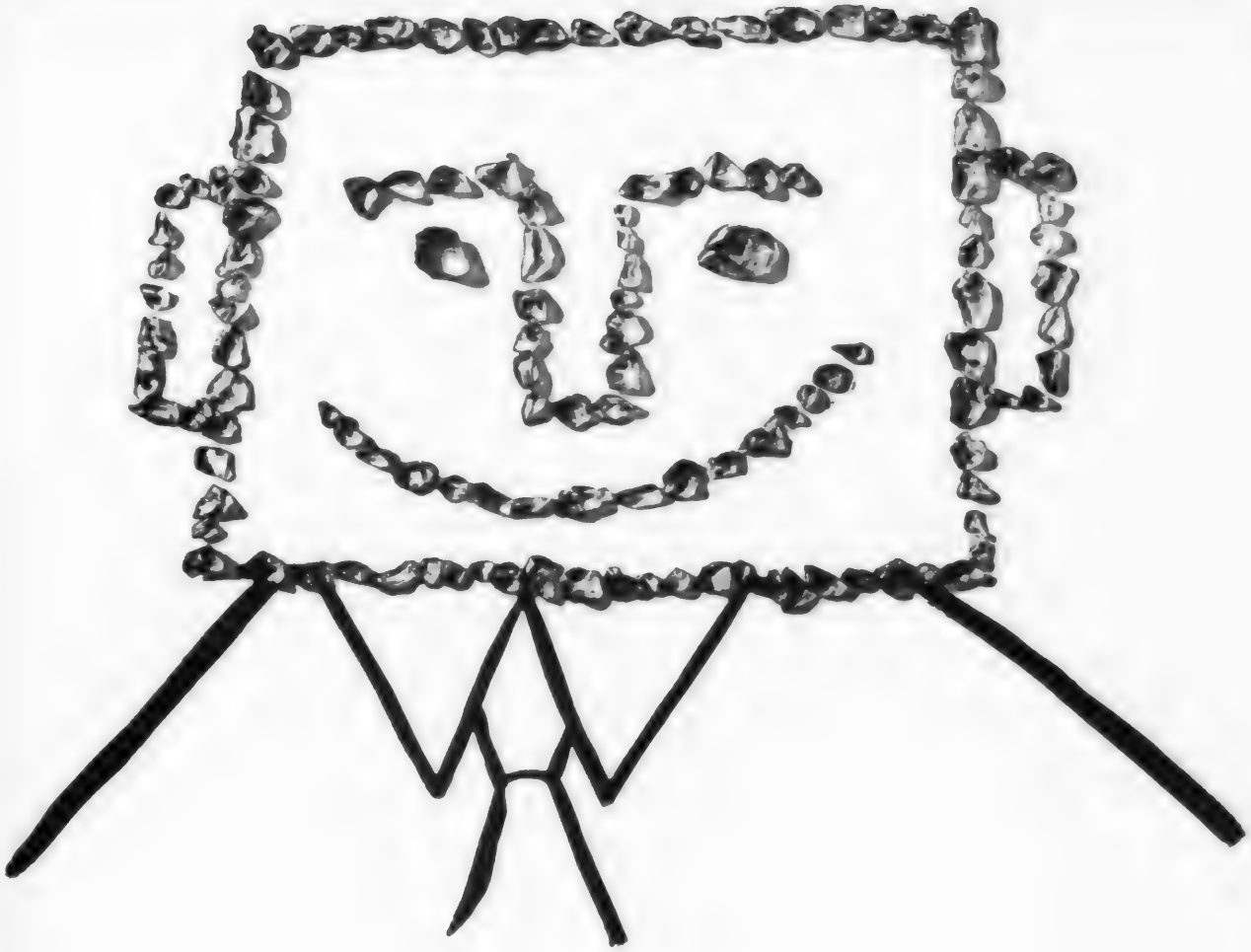

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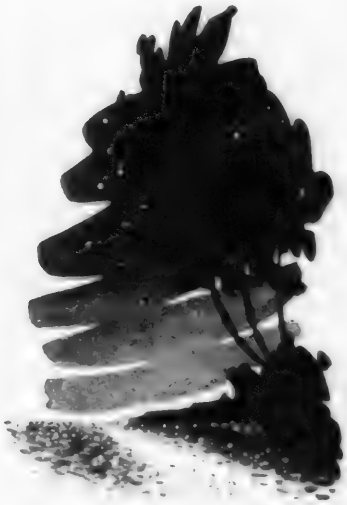
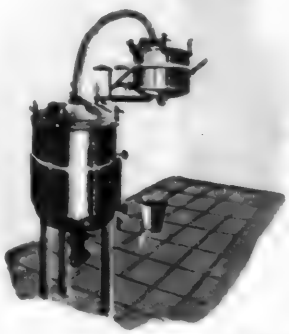


Sunset in the Caribbean ?

No ! not a travel picture, but a colour photograph of the golden head on a brew of stout taken through the inspection window of a stainless steel fermenting vessel.

The quality of beer and stout depends upon colour, taste and brilliance, and brewers know how constant must be their care to avoid any trace of contamination. It is natural that brewers everywhere are turning to stainless steel. This beautiful metal is easily fabricated and readily kept scrupulously clean. In industrial hygiene, as in the home, stainless steel is the preferred material. (Photograph by courtesy of the makers of *Jubilee* stout).



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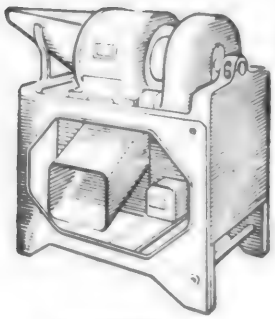
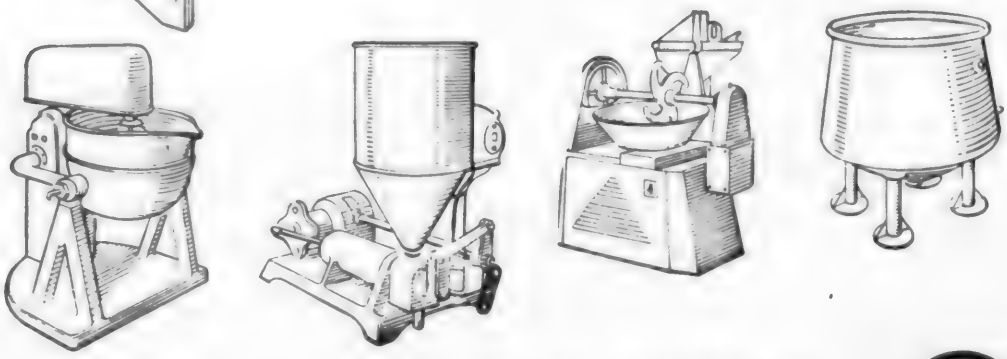


goes a long way . . .



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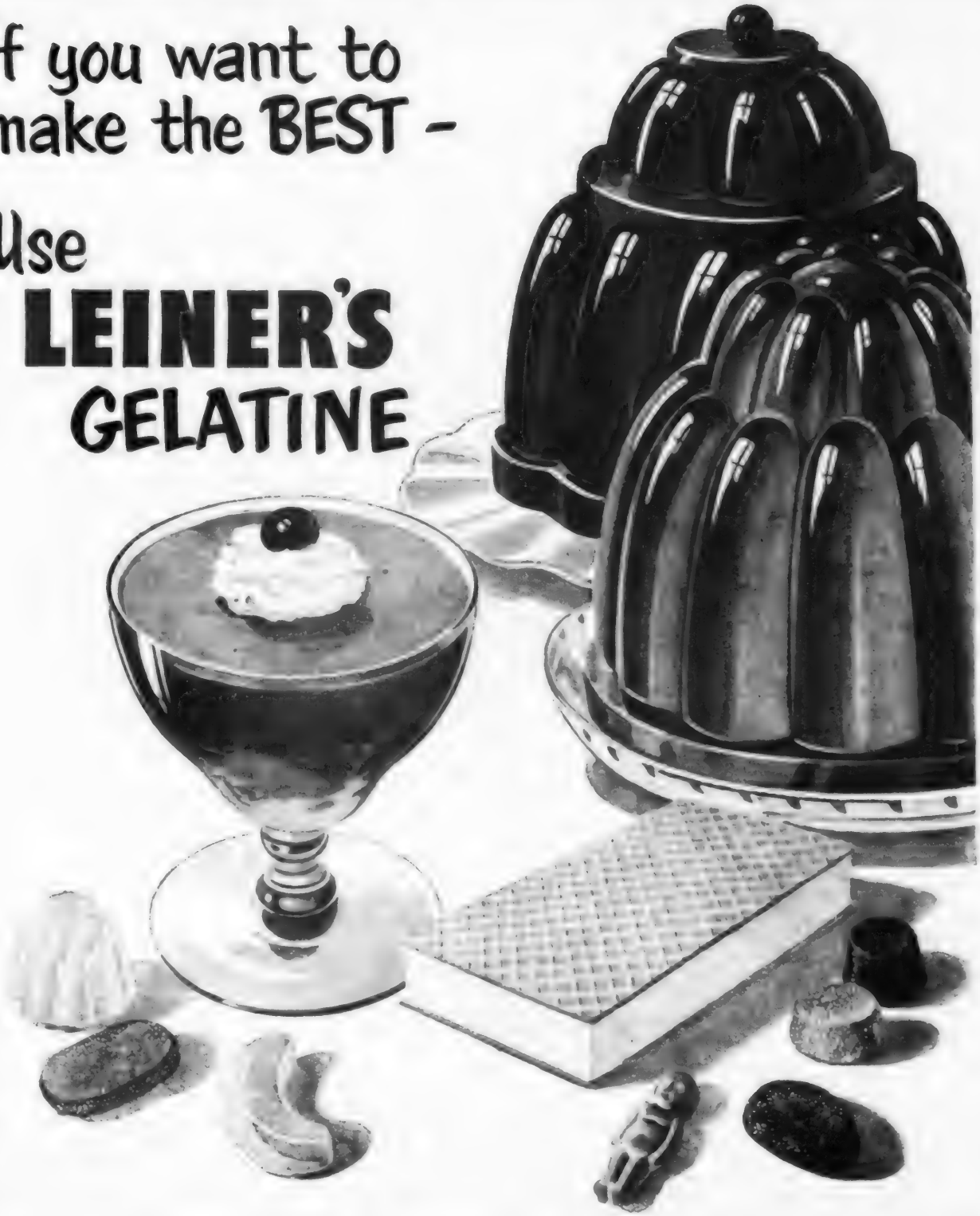

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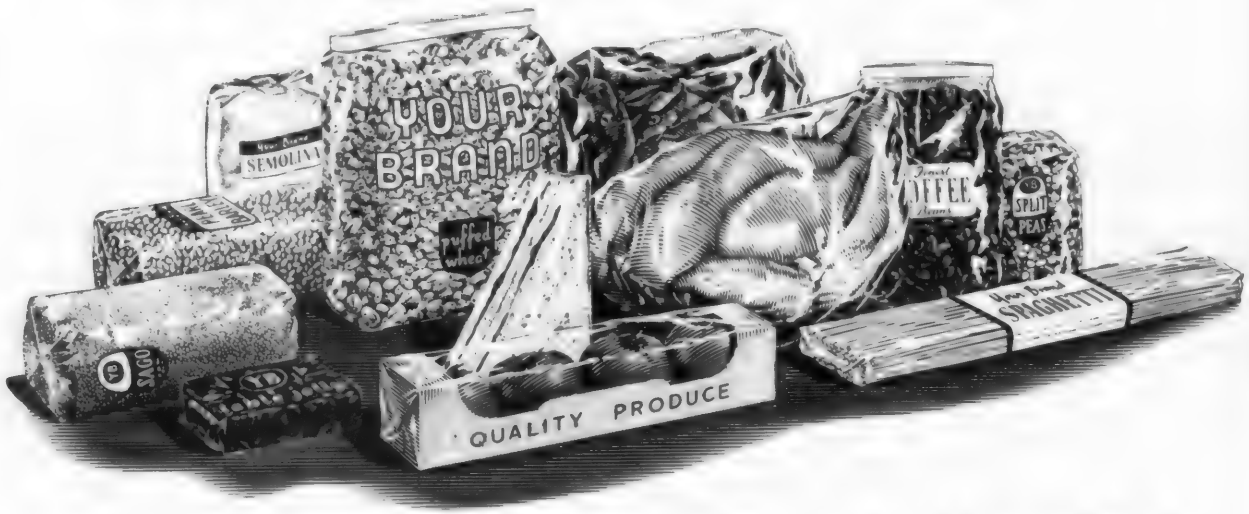

like food itself!

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Wrap it in "CELLOPHANE"

The clean sparkle of the film gives food products a lead from the start. Quality and freshness are kept *in*—everything that hinders freshness kept *out*.

Show it in "CELLOPHANE"

Customers buy what they see. Transparency, greater than window-glass, shows *at a glance* the best points of your product.

Sell it in "CELLOPHANE"

Modern selling demands transparent, easy-to-handle units with no weighing, waste or waiting.

For YOUR Product

"CELLOPHANE" — the *natural* wrapping for modern, hygienic food selling — will place your product more surely in the centre of display where customers in a buying mood, will see it and *want* it!

Our scientists, engineers and designers, able and imaginative, drawing upon the unequalled experience of the Company and its world-wide associates, will be glad to help and advise you with your packaging problems whenever you like.

There is no obligation — CONSULT US TODAY.

"CELLOPHANE"—the first packaging film—and the greatest!

"Cellophane" is the registered trade mark of British Cellophane Limited and denotes the brand of cellulose film manufactured by them.

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EDWARD FISON LIMITED

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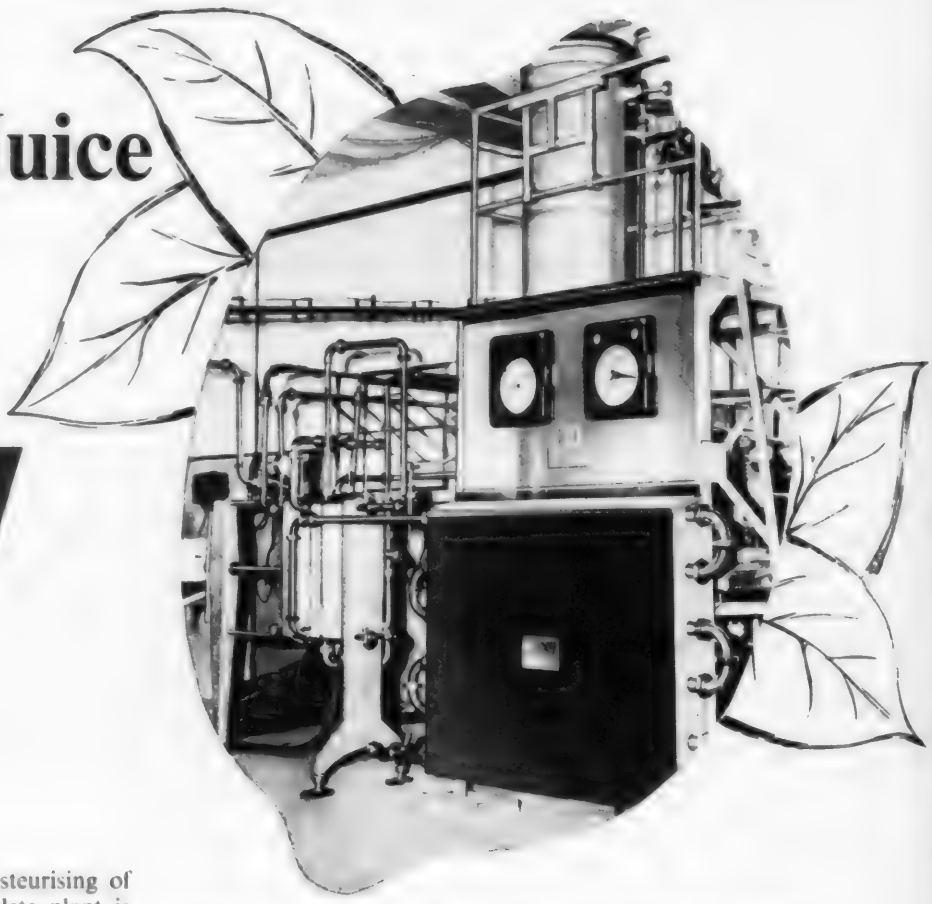
Maltsters for more than a Century

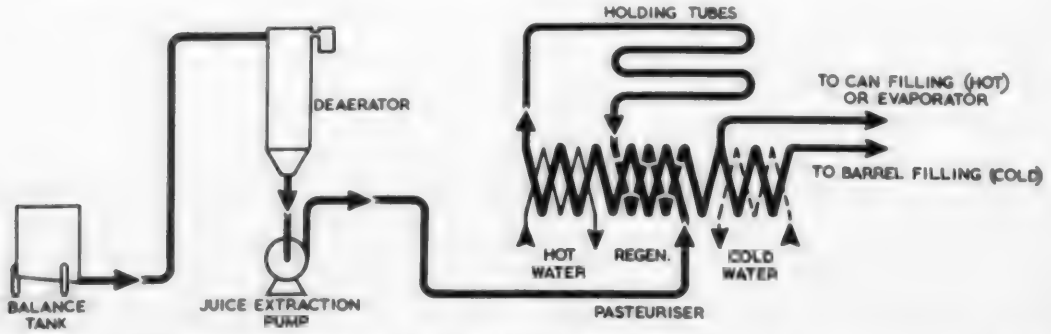
Fruit Juice and APV



The de-aerating and pasteurising of fruit juice in one complete plant is today almost standard practice. APV, pioneers of this integral unit, now have plants in most of the main Citrus growing areas of the World. Typical is this APV De-aerating and Pasteurising Plant installed in the factory of the South African Dried Fruit Co. Ltd., at Wellington, S.A., who say, "The keeping quality and excellence of our citrus juice products (Squash and Base) we ascribe mainly to the efficiency of the APV De-aerating and Pasteurising Plant. Since its installation spoilage of juice has been eliminated entirely. This season we passed through 120,000 gallons of juice with hardly a care."

It is now general for the juice to be de-aerated and/or pasteurised, both at source and again when mixed with sugar for squashes prior to bottling, thus minimising the risk of fermentation during shelf life or barrel storage, even though SO_2 may be present in the juice.

De-aerating and pasteurising of fruit juices is beneficial both for retention of Vitamin C and colour, and also for maintaining "Cloud effect."



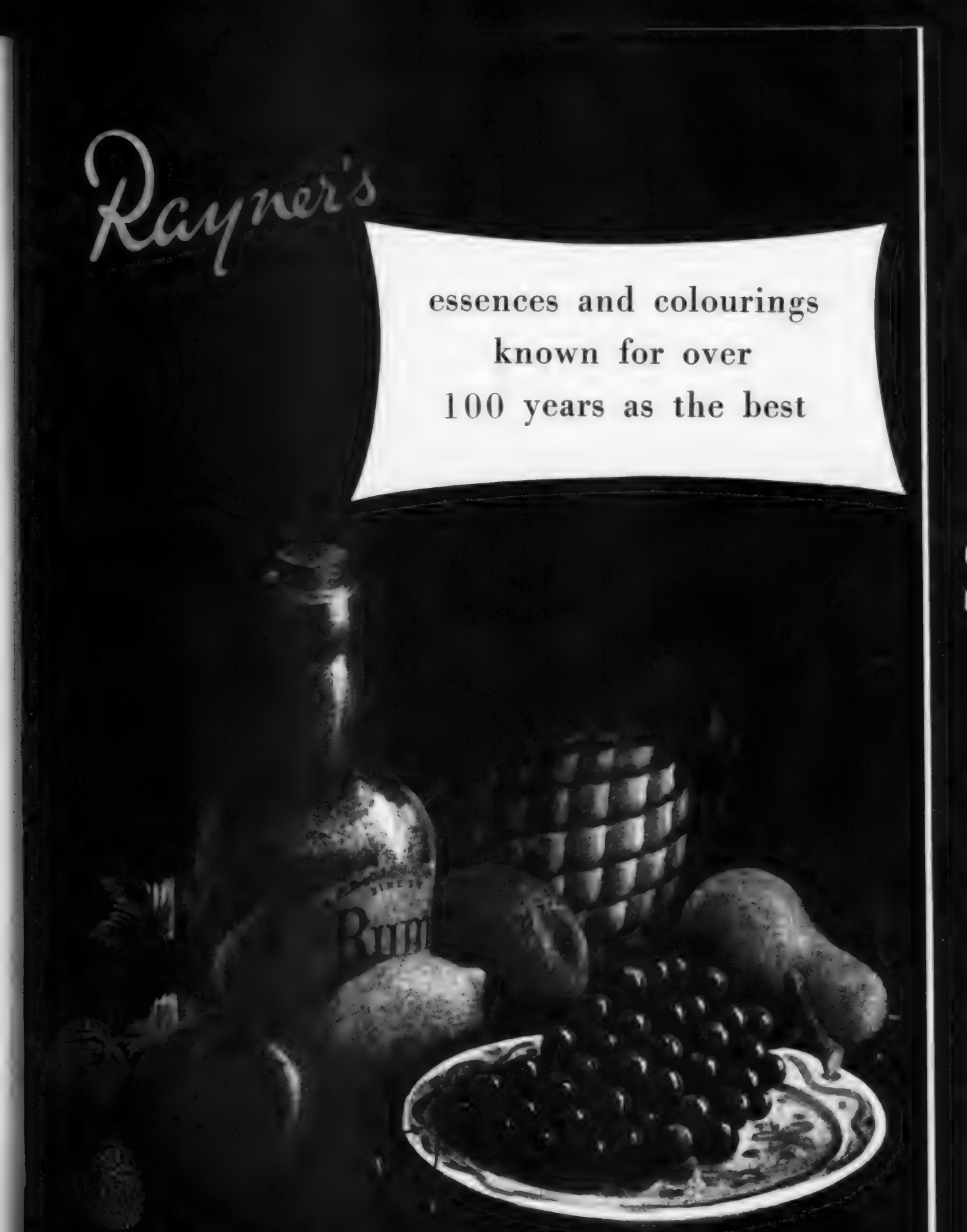
THE A.P.V. COMPANY LIMITED, WANDSWORTH PARK, LONDON, S.W.18

Telephone: Vandyke 4492 (11 lines)

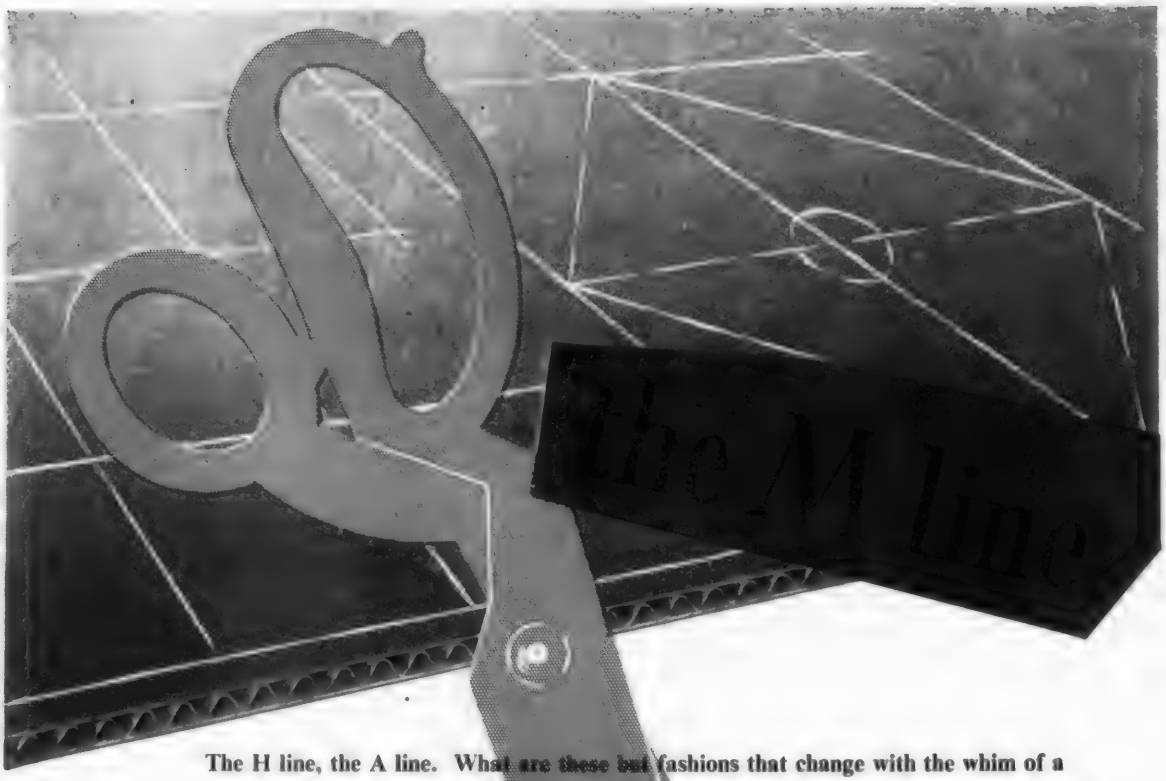
Associated Manufacturing Companies in India, Australia, Canada and Ireland

Rayner's

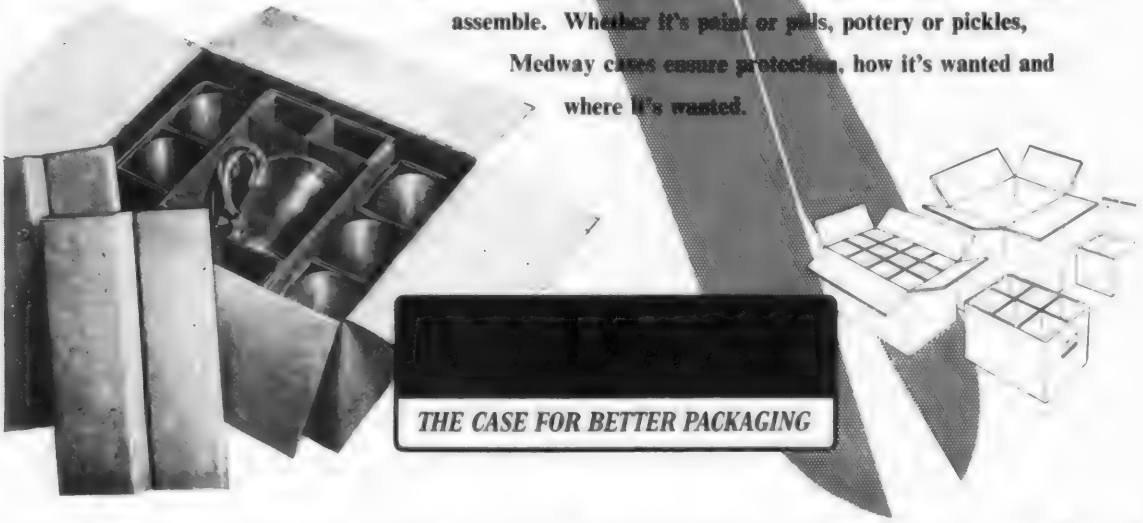
essences and colourings
known for over
100 years as the best



RAYNER & CO., LTD., LONDON N.18



The H line, the A line. What are these but fashions that change with the whim of a designer! The M line is as variable in application as the feminine mode, but is constant in its caressing snugness; for the M line represents the skill and artistry designed into Medway Corrugated Cases, providing protection to goods of all kinds in transport across the world. The skilful design, with its complicated construction, produces a container and fittings which give this generous protection. Your packing department will like them too, for they take up little room in storage and are so easy to assemble. Whether it's paint or pills, pottery or pickles, Medway cases ensure protection, how it's wanted and where it's wanted.



THE CASE FOR BETTER PACKAGING

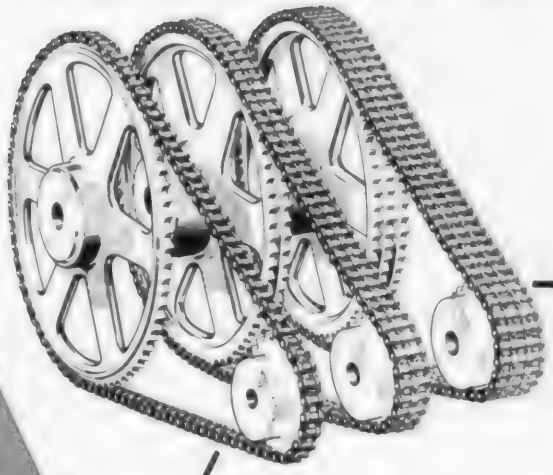
THE MEDWAY CORRUGATED PAPER CO. LTD., NEWHYTHE, MAIDSTONE, KENT

London Sales Office: Blackfriars House, New Bridge Street, London, E.C.4

Reed

by using **RENOLD**

chain drives



you save SPACE

Drive width is less than for any other form of transmission for a given power, and centres can be reduced to a minimum

No. 3 of a series of 4 advertisements

FOR FULL DETAILS OF **RENOLD** STANDARD **STOCK** SERIES CHAIN **DRIVES** WRITE FOR CATALOGUE Ref. 116/93/16E

RC

RENOLD CHAINS LIMITED · MANCHESTER

Transmission and Conveying Chains, Wheels and Accessories for all mechanical purposes.

The COMMER 1¼ ton

FORWARD CONTROL ALL-STEEL VAN

- 50 B.H.P. ENGINE WITH LONG LIFE POROUS CHROME BORES
- FOUR-SPEED SYNCHROMESH GEARBOX
- TELESCOPIC HYDRAULIC DAMPERS FRONT AND REAR
- FLUSH FITTING SLIDING DOORS
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A van you'll be proud to own!

Here is a sturdy all-steel van with success written all over it—your success! With its smart appearance and businesslike finish it will carry your prestige proudly through the streets, whilst its sound practical design will give remarkably long life and low operating cost.

Send for a brochure TO-DAY, or see your local Commer Dealer.

Smart and functional! **COMMER**

A PRODUCT OF THE ROOTES GROUP

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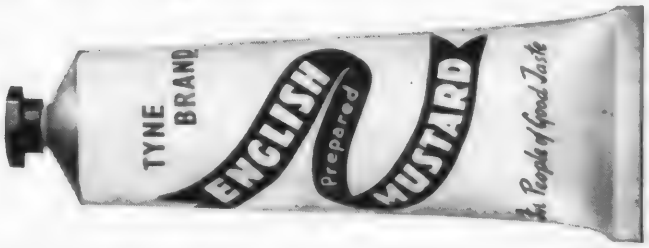
Food for thought!

FOOD IN TUBES IS
HYGIENIC, COMPACT,
EASIER TO HANDLE.



Tubes

for

food—

JOHN DALE LIMITED

NEW SOUTHGATE · LONDON · N.11

TELEPHONE: ENTERPRISE 1272

Having a hand in Productivity

In every industry or trade, electrical equipment is the key to modern production methods. There are probably more production-boosting and money-saving devices than you know of. Your Electricity Board can help you and give you sound advice.

They can also make available to you, on free loan, several films on the uses of electricity in Industry — produced by the Electrical Development Association.

E.D.A. are publishing a series of books on "Electricity and Productivity". Four titles are available at the moment; they deal with Higher Production, Lighting, Materials Handling, and Resistance Heating. The books are 8/6 each (9/- post free) and the Electricity Boards (or E.D.A. themselves) can supply you.

Individual Drive

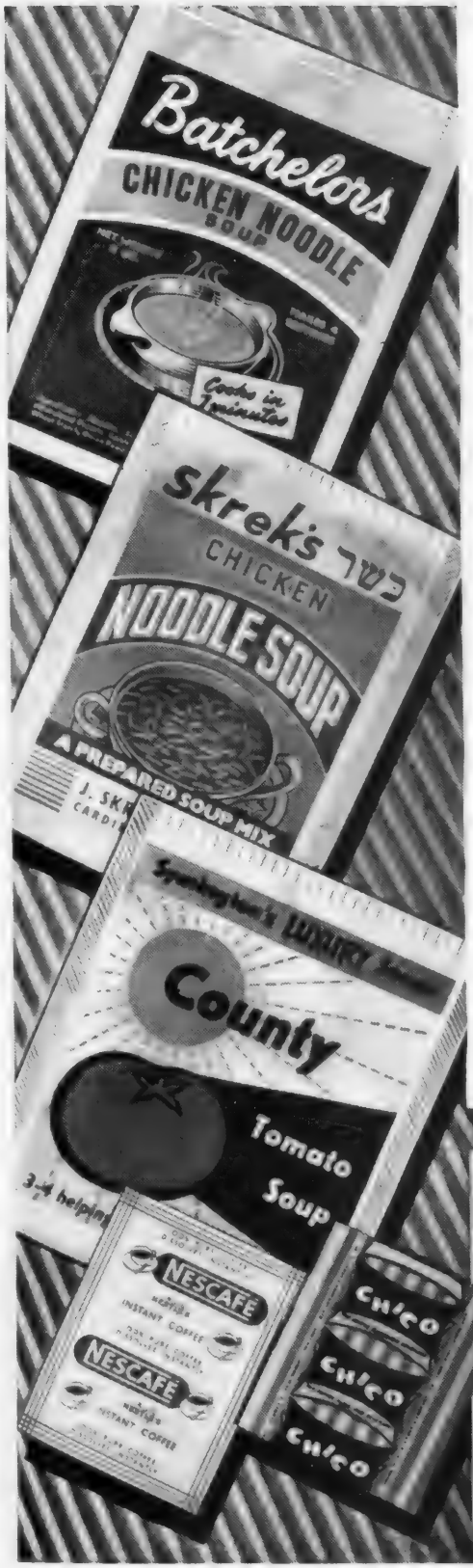
Individual drive means power exactly where it is wanted. The motor is built into the tool and direct coupled to the driven shaft. Efficiency is higher, floor space is saved, belts are done away with. The machine is a self-contained unit and the drive is direct. There are no gears, no belts—so maintenance is low.

Individual drive means that the motor is tailored to the tool—control is simplified and there is no waste of power. The tool does the work at the highest speed and the lowest cost: lowest in maintenance, lowest in rejects, lowest in power consumption. Putting the power where it is wanted is—

only one of the aids to higher productivity that Electricity can bring you.

Electricity a Power of Good for PRODUCTIVITY

The British Electrical Development Association, *2 Savoy Hill, London, W.C.2*



Foil and Film LAMINATIONS

New Packages that *Sell!*

Metal Box laminations have opened up completely new sales outlets for these famous makers of beverages and soups.

Made and printed by Metal Box these laminations have everything required for sales appeal, economy and long shelf life.

This is another example of the way in which Metal Box offers to industry through its complete hygienic packaging service, the resources of its design studios, its research and engineering facilities and its world-wide service of marketing intelligence.

Metal Box *know-how* does count!

LAMINATIONS give you

ADDITIONAL SALES *by providing new lines*	**SHELF LIFE** *for your product wherever it is sold*
SALES APPEAL *by attractive design*	**ECONOMY** *by high speed packaging*

THE METAL BOX COMPANY LIMITED

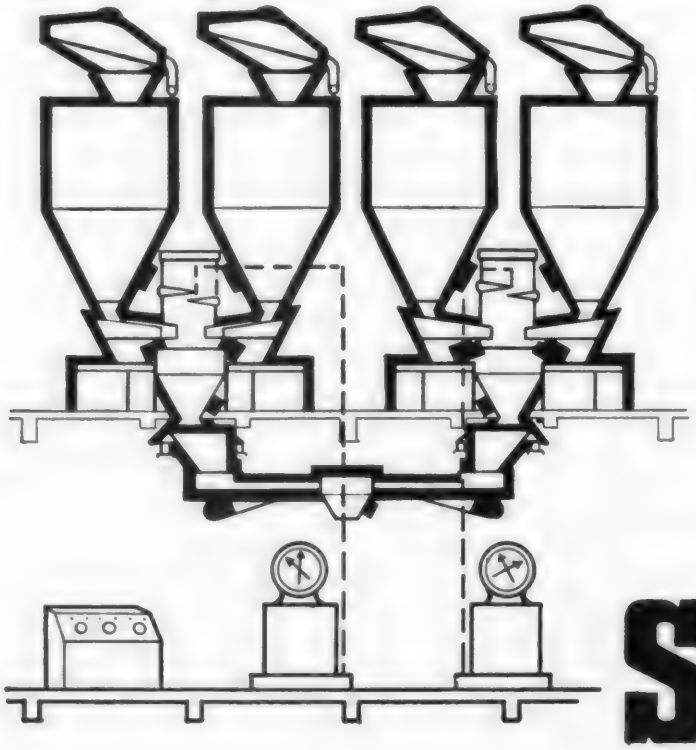
Flexible Packaging Division

THE LANGHAM · PORTLAND PLACE · LONDON W.I.

FP 2280

. . . no hands!

Hygienic, speedy, accurate . . . SINEX automatic weighing and materials handling is all three. "Difficult" materials such as soya meal and cornflour offer no problems in a SINEX installation. Vibrators prevent clogging and choking of hopper outlets; the granulated or powdered ingredients of any mixture are accurately and quickly weighed and brought together for blending either continuously or in batches — without any intervention by hand.



Consult SINEX on any problem of automatic continuous and batch weighing. We design and supply the whole installation, or individual items for handling large or small quantities. Demonstrations arranged at your premises or ours. Literature available on SINEX feeders, sieves and vibrator units.

Sinex

Leaders in vibration handling of all kinds.
Screens, electric, electro-magnetic, and turbo-pneumatic vibrator units.

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Provides Demineralised Water
for Food Manufacture
Demineralised water, produced at
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from a small
Demineralising plants are made in all sizes from Portable units to
larger fixed installations, similar to the one shown here. If you
would like to have them, we will gladly send full technical details.
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ENGINEERING SUPPLIES

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PACKINGS, JOINTINGS
BELTINGS, VEE-ROPES
OILS & GREASES
HOSES, FITTINGS, etc.

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25 lines

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W. H. WILLCOX & CO. LTD
SOUTHWARK STREET, LONDON, S.E.1

ALUMINIUM AT WORK

From the familiar . . . . . to the less familiar

Shining packs and containers of aluminium foil have won outstanding success in post-war markets. Used for a wide range of food products, this economical and adaptable packaging material keeps good things at their best. Its clean and shining surface—plain or coloured—makes an ideal starting point for attractive pack design, not only for foil wraps but for adaptable lightweight containers like this new type of throwaway cup. These handy containers can be hermetically sealed for the packing of cheese, ice cream, meat pastes and many processed foods. Have you a product that would pack better, keep longer and sell faster in aluminium?

Aluminium Union Limited

(Incorporated in Canada)

THE ADELPHI, JOHN ADAM STREET, LONDON, W.C.2. *An ALUMINIUM LIMITED Company*

OFFICES, ASSOCIATED COMPANIES AND AGENTS THROUGHOUT THE WORLD

A Guide to the English Character . . .

Resistance to Climate . . .

No doubt it is the Englishman's predilection for cross-ventilation (called 'draughts' by foreigners) that renders him, and her, so resistant to the aquatic life of the native summer. It may be his belief in the virtues of the Arctic blast as an adjunct to health that lends to his cough the virile resonant note of the true open-air man. Engineers, though, are usually more concerned with corrosive attacks than coughing attacks. Fortunately, their remedy is close to hand: they rely upon Semtex. Though the value of Semtex cements as a cough-cure remains to be proved, their efficacy in corrosion-resistance work is undoubted. Works Managers who wish to keep their industrial plant in the pink of physical condition should write to one of the addresses below for the advice and illustrated brochure of the Semtex Industrial Division.

SEMTEX

INDUSTRIAL DIVISION

Headquarters and Southern Area Office:
Semtex House, The Broadway, Welsh Harp, London, NW9 Tel: Hendon 6543

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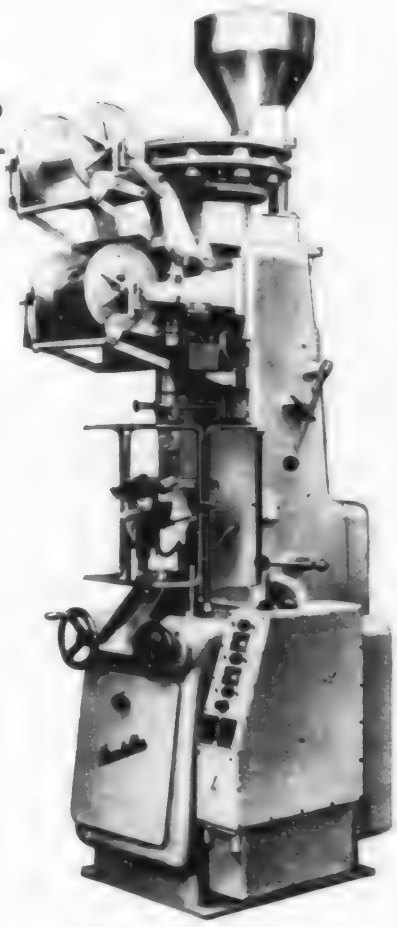
SPECIALISTS in INDUSTRIAL ANTI-CORROSION TREATMENTS · FLOORING & DECKING CONTRACTORS

A Dunlop Company

AUTOMATIC BAG PACKAGING

HANSELLA TRANSWRAP



BAG FORMING
from the reel
of
Heat Sealing film **MSAT**
Heat Sealing coated papers or foils
Films, papers or foils laminated with
Pliofilm, Polyethylene, PVC or Saran

BAG FILLING

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by Weight		**POWDERS**
Volume		**LIQUIDS**
or Count		**SEMI-LIQUIDS**

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COMPLETE IN ONE MACHINE

Bag Sizes (Type 125A):
Min. 2⅛" square
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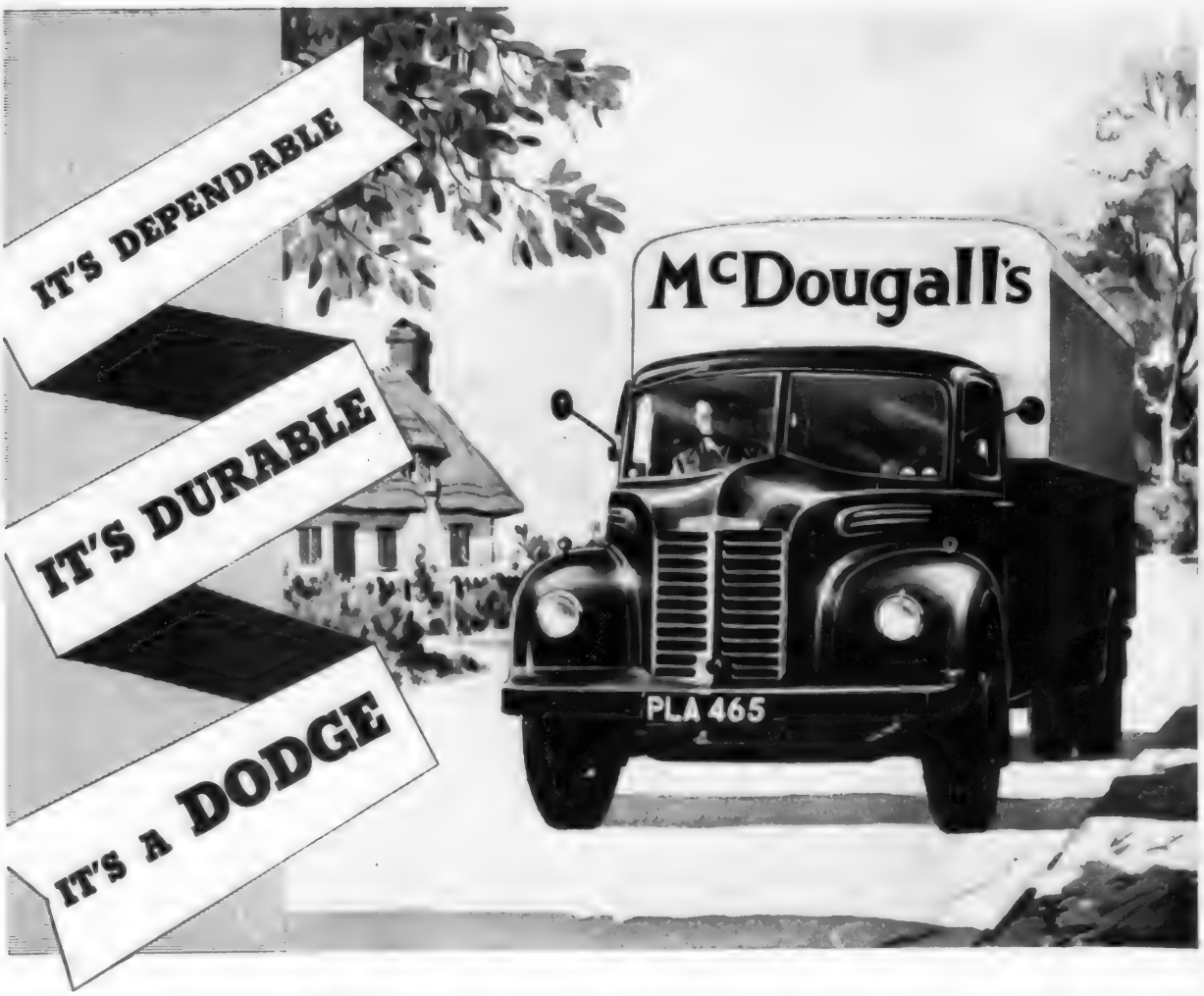
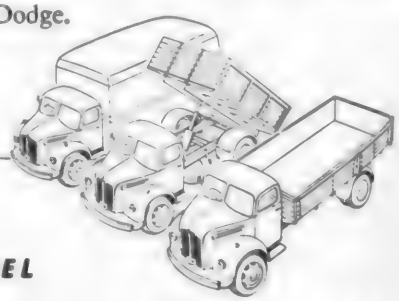


the truck you can trust

ONLY HARD FACTS count with large business concerns. Only Dodge features add up to that greater strength of purpose in design and construction necessary to cope with their rigid transport schedules.

Value-wise operators who rightly place earning power before initial cost find much in a Dodge to impress them. They see in its heavy duty, quality construction an honest-to-goodness truck devoid of 'frills' but embodying all the essentials for successful hard trucking operations. In fact, a truck designed to withstand the rigours of the toughest, roughest usage.

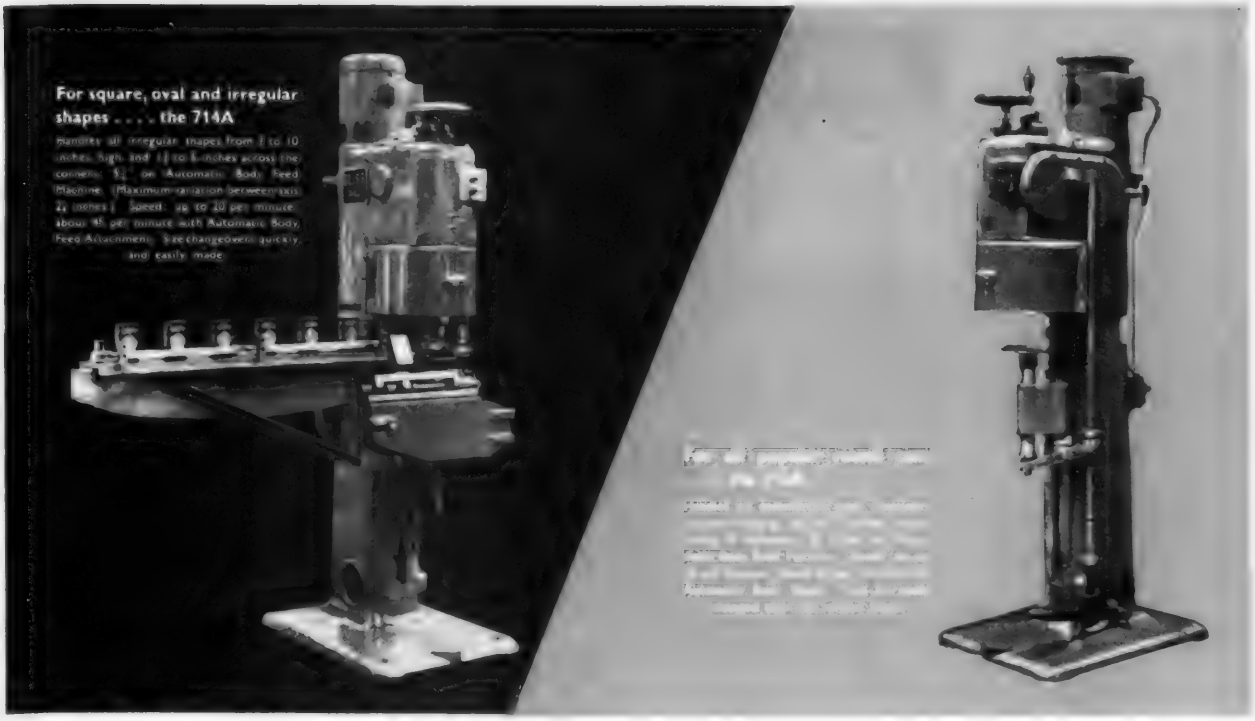
It will pay you to make a point of investigating the Dodge before you decide on your next truck. See for yourself why more and more users are putting their trust in Dodge.



KEW DODGE

MODELS FROM 2 TO 8 TONS • PETROL AND DIESEL

DODGE BROTHERS (BRITAIN) LIMITED · KEW · SURREY


For square, oval and irregular shapes . . . . the 714A
Handles all irregular shapes from 2 to 10 inches high and 1½ to 6 inches across the corners. ¼" on Automatic Body Feed Machine. (Maximum variation between cans 2½ inches.) Speed: up to 40 per minute, about 45 per minute with Automatic Body Feed Attachment. Size changeovers quickly and easily made.

Slam the Lid on Seaming Costs—

with these two

BLISS Double Seaming Machines

Both of these machines have this in common: they were designed and built with the packers' problems in mind.

The 712 and 714 have all working and moving parts totally enclosed (though easily accessible). The seaming rolls work as opposing "teams", giving a *balanced* pressure at all times, thereby relieving the strain and wear on the seaming chuck. All gearing operates in oil baths; bearings have automatic, forced lubrication.

In short, Bliss' years of pioneering experience in the can machinery field is your assurance that the 712 and 714—and all the equipment in the Bliss line—is designed with your needs foremost.

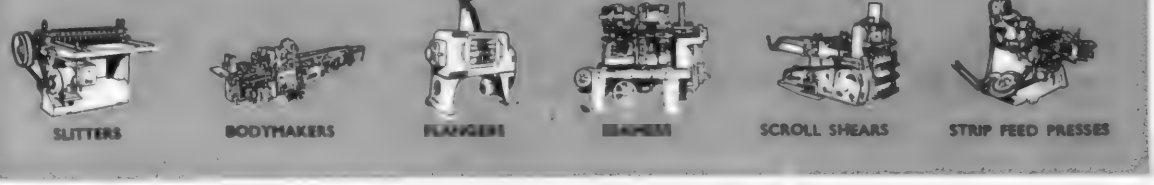
E. W. BLISS (ENGLAND) **LTD., City Road, DERBY** Telephone: DERBY 45801

London Office: 2 3 THE SANCTUARY, WESTMINSTER, S.W.1 [Telephone: ABBEY 3651

B.31

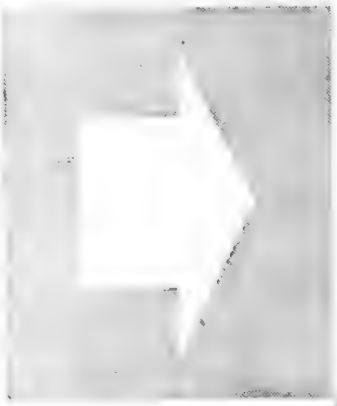
BLISS on your machine is more than a name . . . *it's a guarantee!*

BLISS CAN AND CONTAINER MAKING MACHINERY



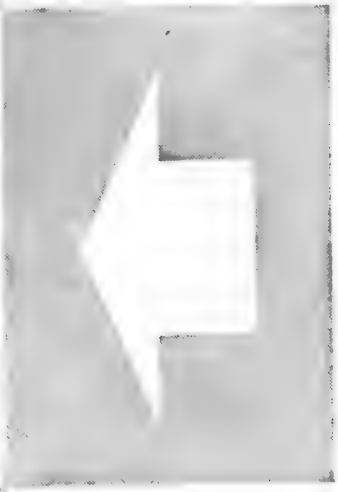
I.C.I. DENDRITIC SALT

–a NEW fine grade for foodstuffs



I.C.I. Dendritic Salt is a fine vacuum salt with a new crystal shape. It is soft and floury, with the following distinctive qualities—which are of special advantage in many applications in the food and dairy industries :

- Outstanding non-caking properties
- High purity—99.6% sodium chloride
- Blends well with other finely-divided materials
- Low bulk density—ensuring good covering power
- Rapidly soluble in water

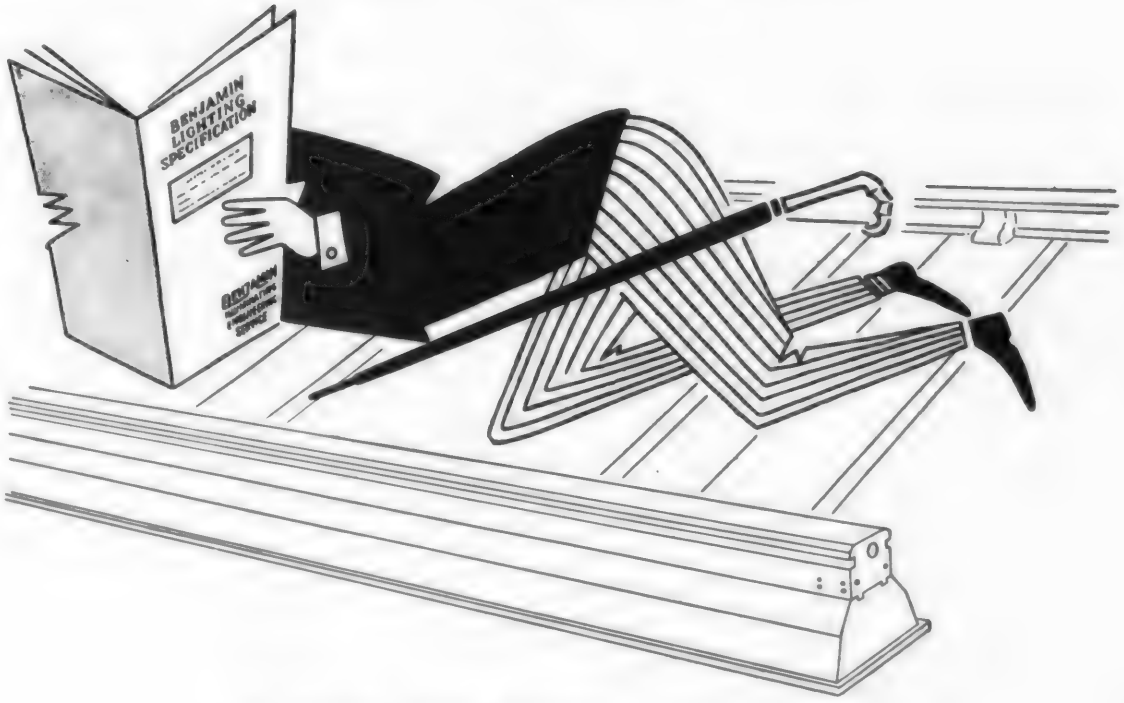


I.C.I. Dendritic Salt is of particular interest to users of Dairy or fine Crystal salt, since it not only offers technical advantages but is also cheaper.
Imperial Chemical Industries Ltd. are the sole manufacturers of Dendritic Salt, which is protected by patents in Great Britain and other countries throughout the world.

IMPERIAL CHEMICAL INDUSTRIES LTD.
LONDON, S.W.1

READING BETWEEN

THE LINES . . .



. . . of a Benjamin Lighting Specification, it's obvious that Benjamin are particularly well-informed when it comes to tungsten and fluorescent lighting. Backed by years of intensive research, a Benjamin specification points the way to mobilising light as a business-builder . . . ensures the finest possible seeing conditions* in factory and office, shop and showroom.

Whatever your particular lighting problem, let Benjamin plan a tungsten or fluorescent scheme to fit *your* needs. Write for details.

BETTER LIGHTING BY

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LEEDS: 49 Basinghall Street, Leeds 1. Tel. LEEDS 25579

Smee's 20/54

THE FUNCTION

of

STURTEVANT AIR CONDITIONING

is to aid the handling of edible materials to their best advantage, improve the quality of the finished product, and to produce conditions which are conducive to greater output.

Clean air makes a major contribution to the standards of hygiene which are, of course, exacting in the food processing industry.

Sturtevant engineers are ready to examine potential applications and to submit their recommendations. **General particulars are given in our publication W.4302 which is obtainable on request.**

STURTEVANT ENGINEERING CO. LTD.

SOUTHERN HOUSE CANNON STREET LONDON E.C.4

Flavours with a difference!

They are TRUE!
PERSISTENT!
ECONOMIC!

WILTELL (REGD) *Products*

THE BIRMINGHAM CHEMICAL CO., LTD., WILTELL WORKS, LICHFIELD.

Telephone: LICHFIELD 2166 (3 lines) *Telegrams:* WILTELL, LICHFIELD.

travel safely on the trade routes of the world

TELCON

One of the most revolutionary advances in protective packaging today is *TELCOTHENE — the thermoplastic pioneered by the Telcon organisation. Applied as a continuous coating to paper and board, it gives to these materials a new and tougher resistance to the varying climatic changes encountered in transit. It makes all kinds of goods better and more dependable travellers, ensuring their perfect condition on arrival. TELCOTHENE is hygienic, moisture-proof, non-toxic, heat-sealable, and will not support mould growth in tropical climates. Now being produced in one of the largest plants in the country, TELCOTHENE coated paper is attracting the interest of those who engage in the manufacture, packaging and distribution of foods.

**Telcothene—Polythene processed by Telcon to provide specific characteristics.*

TELCOTHENE
Coated Paper and Board

Product of the Plastics Division of

THE TELEGRAPH CONSTRUCTION & MAINTENANCE CO. LTD

Head Office: 22 OLD BROAD STREET, LONDON, EC2 *Telephone: LONdon Wall 7104*

Enquiries to: The Plastics Division, Farnborough Works, Green Street Green, Farnborough, Kent *Telephone: Farnborough Kent 3585*

Branches at: LONDON · CARDIFF · MANCHESTER · NEWCASTLE · NOTTINGHAM · BIRMINGHAM

Putting the fats before you . . .

A THOROUGH EXAMINATION reveals some interesting developments in the case of creams in baking and catering use—in particular a healthy and growing demand for artificial and synthetic bakery creams of all kinds. Most of these have a margarine or shortening base, and it is important to select a fitting fat for each kind of cream. Unsalted margarines are often chosen—they give a pleasant flavour, and the absence of salt makes them suitable where an emulsification process is used. For filling creams, for fudge or cream icings, for mixing with fondant or marshmallow, a cake margarine is particularly fine, whilst pure white creams demand a high quality white shortening of smooth texture.

Clearly, if you are making creams, it is essential to know your fats. However, there need be no difficulty about that. We have been specialists in the manufacture of margarines and shortenings for many, many years, and our experience—together with the CBC complete range of fats—is at your disposal. We shall be delighted to advise you and prescribe an appropriate fat.

So if you are interested in bakery creams of any kind, please telephone or write to our Sales Director, who will be pleased to put the fats before you and give you all the information you need.

Check your fats with CBC

CRAIGMILLAR AND BRITISH CREAMERIES LIMITED

SUSSEX HOUSE, QUEEN STREET, LONDON, E.C.4. Telephone . CITy 6783

CBC

OCT 31-8-100

safe

silent

efficiency

Designed to meet the need for an electrically propelled truck capable of handling low platform stillages such as are the rule when hand-jack trucks are used, the E116 1 ton Elevating Truck is already widely used in a diverse number of industries.

Our Sales Engineers will be pleased to discuss how B.E.V. Electric Vehicles can solve your heavy load, short run problems.

with the

B.E.V. 1 TON ELEVATING TRUCK

TYPE E116

High Lift Fork Trucks
For full utilization of storage space.

Elevating Platform Trucks
To carry stillages of processed parts between departments often in and out of impossible places.

Fixed Platform Trucks
For heavy duty and Dock service. Many hundreds are in use in principal ports throughout the world.

Locomotives
For Mines, Quarries and Public Works projects.

WINGROVE & ROGERS LIMITED

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AND BROADWAY COURT, BROADWAY, LONDON, S.W.1. Tel: ABBEY 2272 WR4

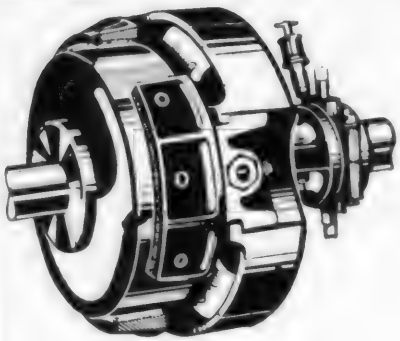
Mummy insists on FRESH wrappings
There's nothing so good as fresh, pure
You'll sell more margarine and butter when they are wrapped in fisher's FLAVOUR RETAINING foils
Foods wrapped in Fisher's Foils not only have a brighter sales outlook, but stay fresh and protected. Whether it's butter, margarine, cheese, or ice cream, it's *better wrapped* in Fisher's Foils. A laminate of Foil, Wax, and Vegetable Parchment paper is superior to any other material for the wrapping of these products; can be printed with attractive colours in Customer's individual designs, trade marks, etc. Write today for full details, prices and samples.
Margarine
BUTTER

FISHER'S FOILS LIMITED · EXHIBITION GROUNDS · WEMBLEY · MIDDLESEX · ENGLAND
TELEPHONE: WEMBLEY 6011
CABLES & GRAMS: LIOFNIT, WEMBLEY (ABC CODE 6TH EDITION)

M-W.81

Crofts FLEXIBLE CLUTCH-COUPLINGS

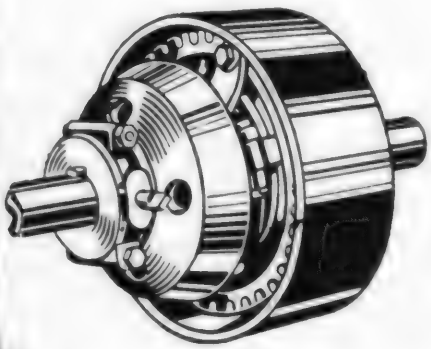
FRICTION TYPE



D/S RIM TYPE
For general shafting drives and normal speeds. Powers up to 1000 h.p. depending on speed.

CENTRIFUGAL CLUTCHES
Reduce peak loads at starting, protecting motors and machines. Powers up to 1000 h.p. depending on speed.

FOR COMPLETE RELIABILITY UNDER ALL OPERATING CONDITIONS



DISC-TYPE
Compact design for all powers and speeds. Powers up to 1900 h.p. depending on speed.

Publication No CF249/ 14

Crofts (ENGINEERS) LIMITED. BRADFORD 3. ENGLAND
PHONE 65251 (15 LINES) GRAMS "CROFTERS BRADFORD"

A Pectin for every purpose

ELPEX

The standard Apple Pectin. Completely starch-free, its high quality, clarity, and jel-making properties never vary.

NSF GRADE

A pectin of standard "Elpex" setting strength but specially prepared for use in darker jams where maximum clarity is not essential.

XL GRADE

For specialised products such as jelly marmalade. In colour and clarity, "X.L.Grade" replaces powdered pectins at less than half the cost.

and NOW!

LIQUID SLOW-SET PECTIN

Guaranteed setting temperature. Specially suited for 7's, 14's and bulk packs of jam where ordinary pectin causes caramelisation and pre-setting.

EVANS APPLE PECTINS

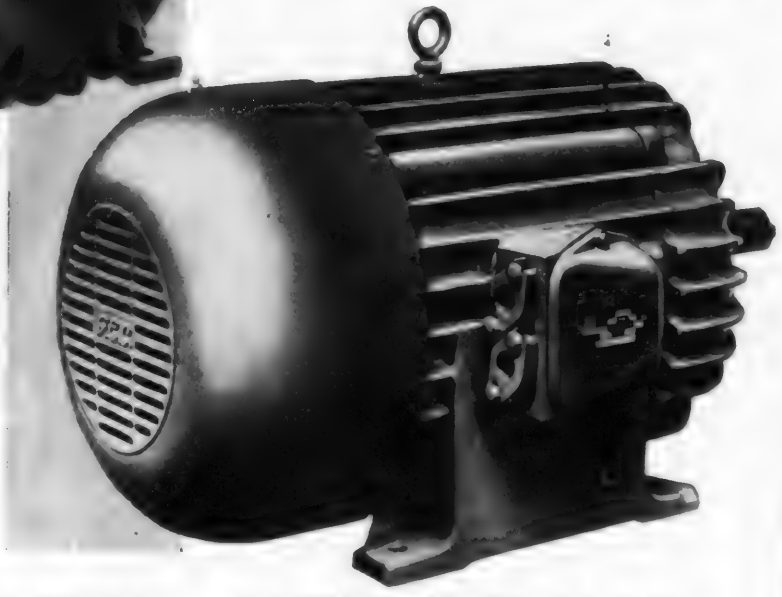
TWENTY-FIVE YEARS ago, William Evans & Co. pioneered the manufacture of Pectin in Great Britain. Their unique experience is freely available to jam makers through the Technical Advisory Service. Sample quantities for production testing will be sent on request.

WILLIAM EVANS & CO. (HEREFORD & DEVON) LTD., WIDEMARSH, HEREFORD

Telephone your enquiries—Hereford 2313

Built to last!

G.E.C. MOTORS



STANDARDISED DIMENSIONS TO B.S. 2083 (1954)

AVAILABLE FROM STOCK

TOTALLY ENCLOSED FAN COOLED

END WINDINGS TAPED TO GIVE INTER-PHASE INSULATION AND RIGIDITY

SIX LEADS BROUGHT OUT TO TERMINAL BOX

OUTPUT UP TO 25 h.p.

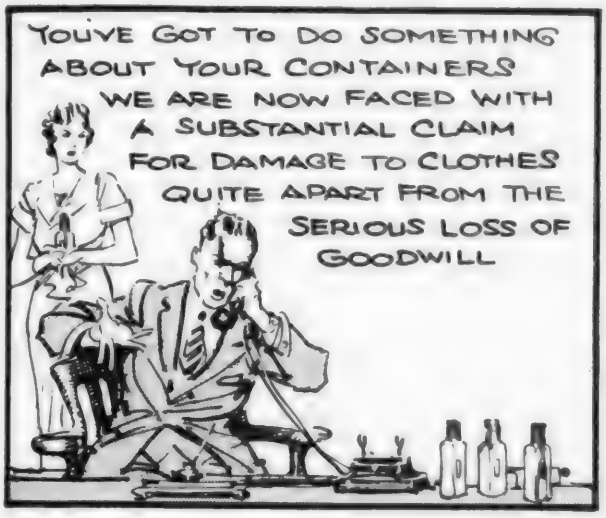
DOUBLE IMPREGNATION

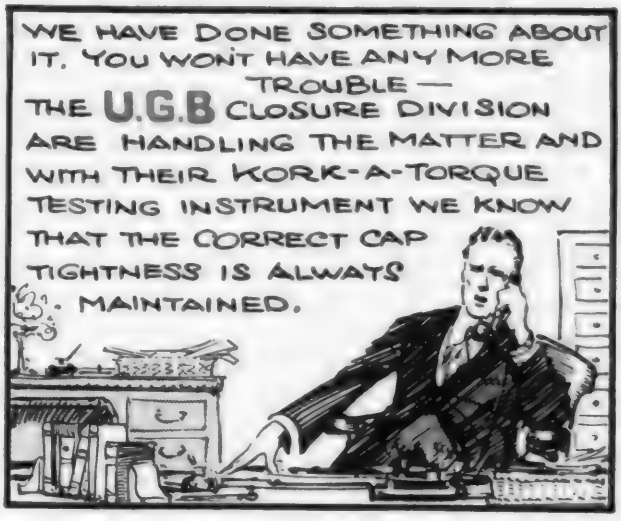
FOR NORMAL DUTY IN ANY PART OF THE WORLD

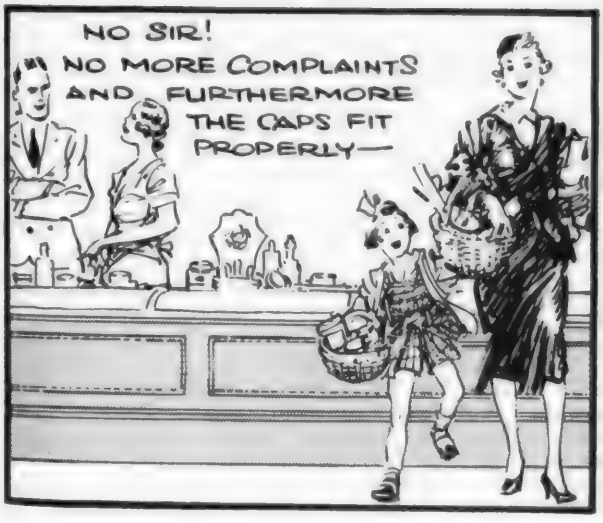
BACKED BY 50 YEARS EXPERIENCE

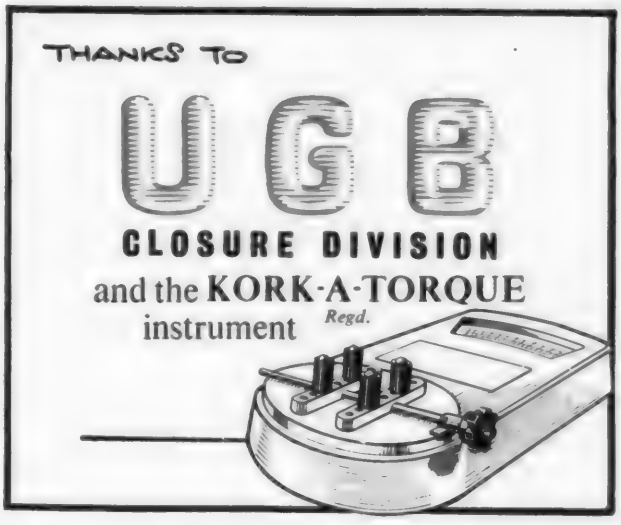
Ask for Technical Description No. 431

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2





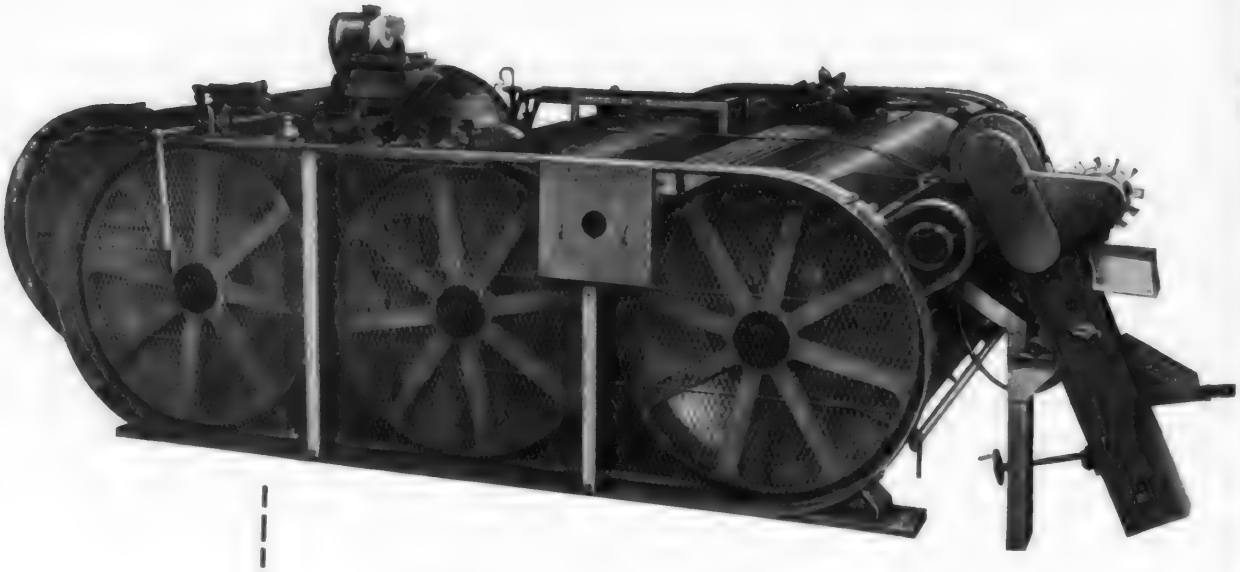




UNITED GLASS BOTTLE MANUFACTURERS LTD

8 LEICESTER STREET, LONDON, W.C.2

Telephone: GERRARD 8611 (18 Lines) *Telegrams:* UNGLABOMAN, LESQUARE, LONDON



another British engineering triumph . .

The Mather & Platt

Rotary Sterilizer

The machine illustrated above was recently installed in a well-known British cannery, and has an output of 400 cans per minute at an approximate cooking time of 19 minutes.

Mather and Platt Ltd can offer a complete range of continuous cookers, including the following:

PRESSURE COOKERS

- Agitating Rotary Sterilizers.
- Non-Agitating M. & P. Cookers.
- Hydrostatic Cookers.

ATMOSPHERIC COOKERS

- Agitating Round Shell Cookers.
- Agitating Square Tank Cookers.
- Non-Agitating M. & P. Cookers.
- Hydrostatic Cookers.

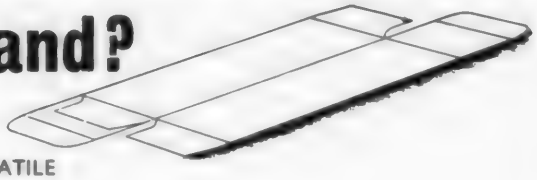
507

Mather & Platt Ltd.

RADCLIFFE, MANCHESTER

London Office: PARK HOUSE, 22 GREAT SMITH STREET, LONDON, S.W.1

Are YOU wasting time and money doing this by hand?

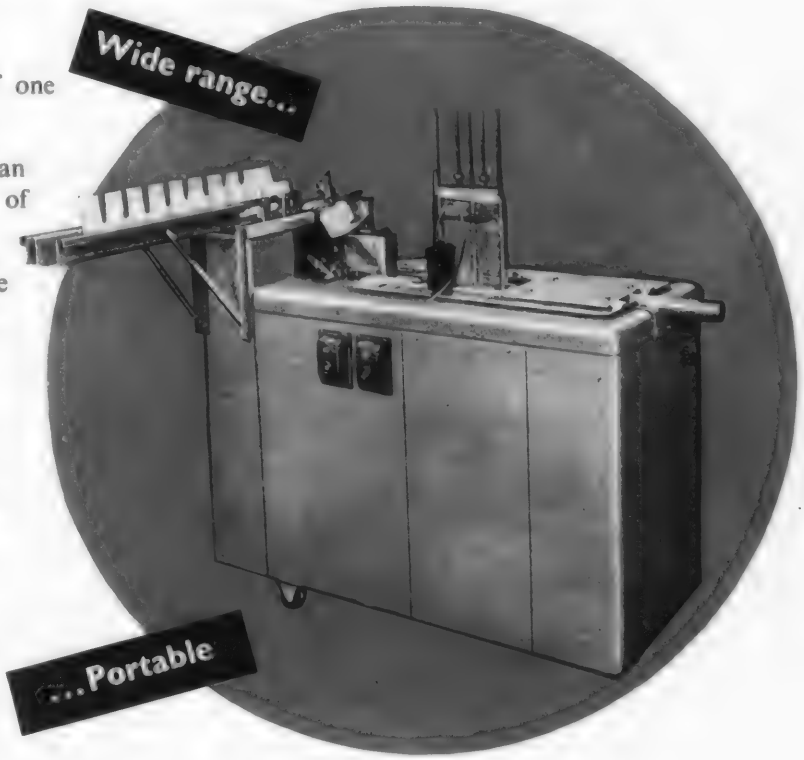


REDUCE LABOUR COSTS WITH THE VERSATILE

TUCK-O-MAT & CONVEY-O-MAT

AUTOMATIC MACHINES FOR ERECTING REVERSE-TUCK CARTONS

- Needs only the part time of one operator.
- Remarkable versatility. You can set up any size or shape of tuck-end carton.
- Changeover to different size takes only 10/20 minutes. Change parts inexpensive.
- Mounted on rubber wheels—one person can move it.
- Simplicity in design and construction reduces maintenance costs to a minimum.
- Saving in wages alone soon repays outlay.



Peters of Slough

SLOUGH 23201

G. D. PETERS & CO. LTD., ENGINEERS, SLOUGH, BUCKS.

MAKERS OF...

Unscrambling Hoppers, Capping, Cap Lining, Lidding, Labelling and other machinery.

Liquid process control by **MEASUREMENT**

1½" S 7. stainless steel meter with screw on flanges and 12" vertical index.

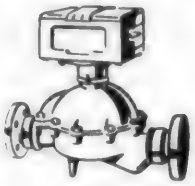
When you require to measure bulk or batch quantities of edible liquids, oils, spirits and solvents, hot or cold water, we can supply meters with summating, resettable, electrical presettable, direct reading or pointer type index attachments (as illustrated) and control equipment.

MEASUREMENT

INDUSTRIAL **LIQUID** *METERS*

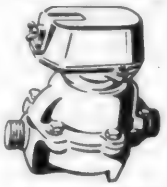
(A COMPANY OF THE PARKINSON & COWAN GROUP)

MEASUREMENT LTD. HYDRAULICS DIVISION
119 Union Street, Oldham, Lancs. Telephone: Main 6432.
LONDON: TERMINAL HOUSE, Grosvenor Gardens, London, S.W.1.
Telephone: SLOane: 0111.

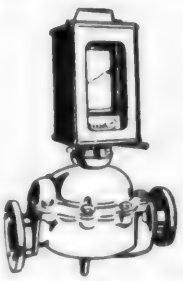


BOX TYPE COUNTER
Re-settable batch-dispensing counter with 7-digit cumulative total register.

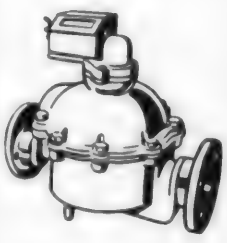
• **VERTICAL RE-SETTING INDEX**
Can also be used to pre-set a determined quantity, with electric trip to operate solenoids, pumps, warnings, etc.



ZEROSET INDEX
Simple turning motion re-sets indicator to zero.



MECHANICAL RECORDER
Gives a graphic record on 5" x 13" chart; suitable for 4 hour, 8 hour, 1 day, 7 day periods



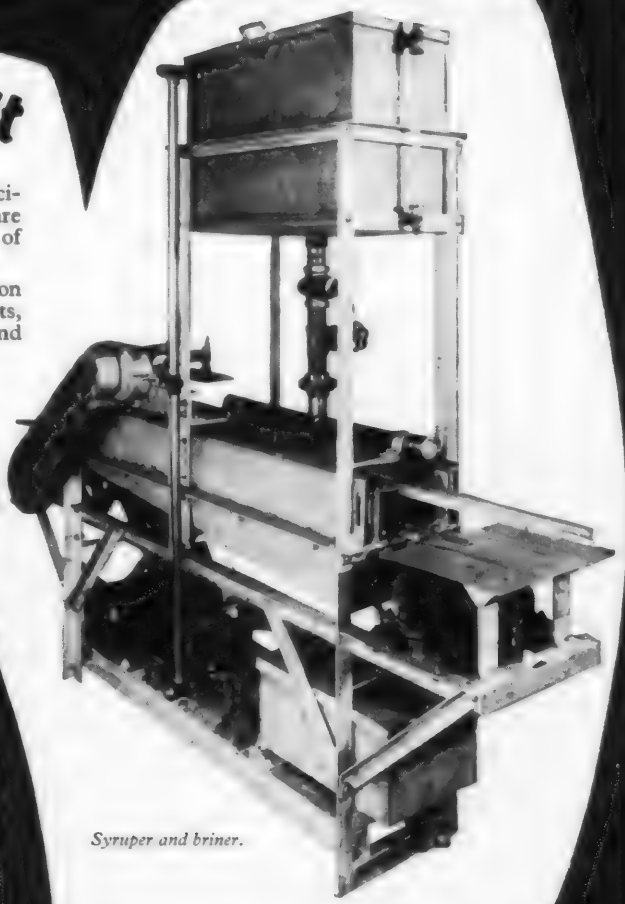
FREDEX CONTROLLER
Automatic means for continuous dispensing of fixed quantities of liquids.

Let G.C. handle it

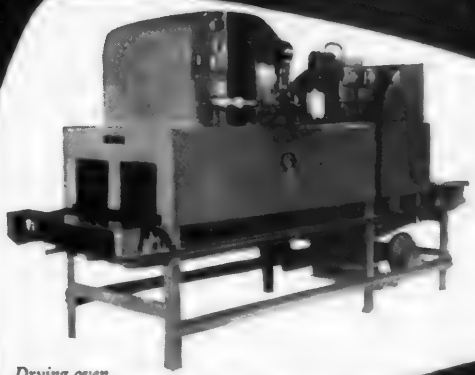
Increased production is dependent upon the efficiency of your mechanical handling equipment. We are specialists in the design and manufacture of plant of all kinds for the Food Industry.

Our products include can-handling plant, friction and bar elevators, cable conveyors, ovens, retorts, coolers, washers, blanchers, exhausters, graders and gooseneck elevators.

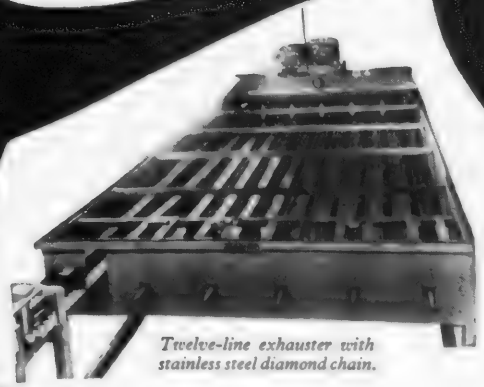
Consult us on your particular requirements.



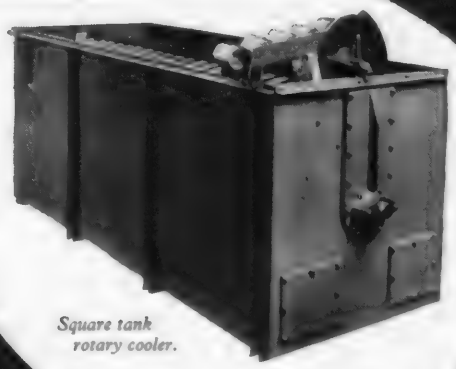
Syruper and briner.



Drying oven as supplied to Dewey & Almy Ltd.



Twelve-line exhauster with stainless steel diamond chain.



Square tank rotary cooler.

BRABY

FREDERICK BRABY & CO., LTD.

G. C. Engineering Division

London Works, Thames Road, Crayford, Kent *Telephone: Bexleyheath 7777*

(Successors to the G. C. Engineering Co. Ltd., Deptford, S.E.8.)

Presented with pride!

Seal your pack with " Viskrings " and establish confidence between you and your consumer. YOU can be confident that your bottling will reach the consumer perfect and intact. The CONSUMER will be confident that the contents are genuine and as expected—a fine product, perfectly presented. Seal all stoppered and screw-capped bottles with " Viskrings ". There is a " Viskring " to fit every bottle neck, available in a wide range of colours. " Viskrings " can be printed with your brand symbol. Send your container complete with primary closure to us for fitting. We will return it with samples and quotations for any quantity.

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- They are self-adjusting.
- They prevent the blowing or riding of stoppers.
- They prevent the movement of screw caps once they are tightened.
- They afford protection for branded products and reduce pilferage and evaporation.
- CELLULOSE CLOSURES . . . Contain No Metal . . . Require No Adhesive.

for your Sales sake fit "Viskrings"

THE VISCOSE DEVELOPMENT COMPANY LIMITED

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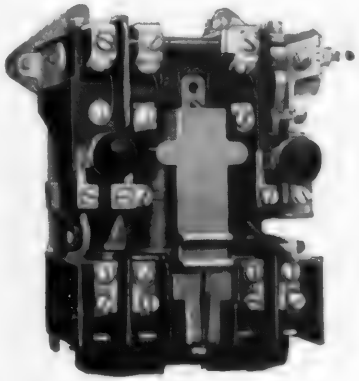
A. C. Direct-on-line CONTACTOR STARTER Type DOC71

for single-phase or polyphase non-reversing squirrel-cage induction motors.

This new starter is elegant in appearance, sturdy in construction, and dependable in operation. It is available for motors up to 5 horsepower, and complies with BS.587 for "Frequent Duty", i.e. forty starts per hour.



The starter, comprising a triple-pole contactor with normally-open auxiliary switch and triple-pole hand-reset thermal overload relay, is enclosed in a distinctive die-cast aluminium case with integral START-STOP push buttons.

Up to 5 h.p. 200-550 volts
25-60 cycles

DELIVERY FROM STOCK

Member of the AEI group of companies

THE
BRITISH THOMSON-HOUSTON
COMPANY LIMITED, RUGBY, ENGLAND

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TWO TRAINING SCHEMES for BOILER OPERATORS

● ***In view of the coal situation the Board of Directors of the National Industrial Fuel Efficiency Service urges all firms to encourage their Boiler Operators to attend a Technical College or undertake a N.I.F.E.S Course.***

TECHNICAL COLLEGE COURSES

Practically every technical college will provide a simple course for Boiler Operators in preparation for the City and Guilds Certificate at a cost not exceeding £2 2s. plus examination fee of 25s. per student. Courses usually begin in late September but early enrolment is advised.

Please communicate at once with your nearest technical college.

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STAINLESS STEEL

Tailor-made plant and equipment in stainless steel calls for craftsmanship and knowledge far beyond the usual.

Giusti craftsmanship is hard won over many years of experience—it is ready to serve you with the quality of work you need.

Quotations without obligation.

A Giusti-built steam jacketed vessel of 50 gallon capacity for processing of materials under pressure.

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Plant & Equipment Engineers to the Chemical and Food Industries

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How do your preserves fare at the finishing stage?

Kellie filling machines give quality products the perfect finishing touch

ROBERT KELLIE & SON LIMITED
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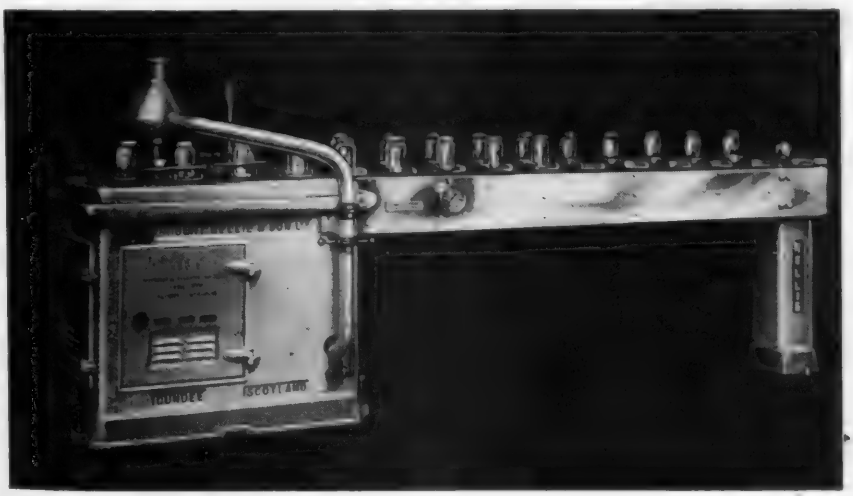


KELLIE

7FP Patent Continuous Filling Machine with micro filling attachment for jams, jellies, marmalade, honey syrups, lemon curds, soups, broths and all liquid or semi-liquid free-flowing food products.

MOISTURE CONTENT

in 3 Simple Steps that take less than ½ min.

"N.P.L." MOISTURE METER

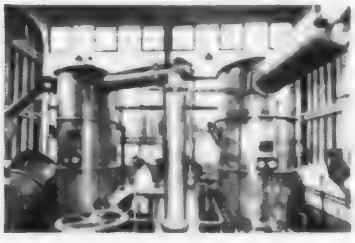
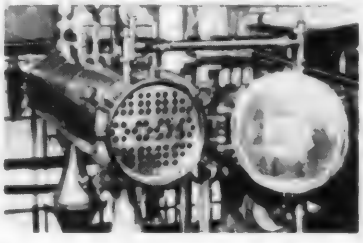
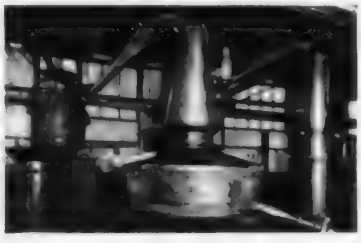
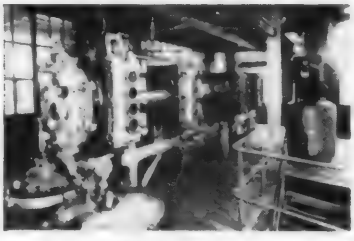
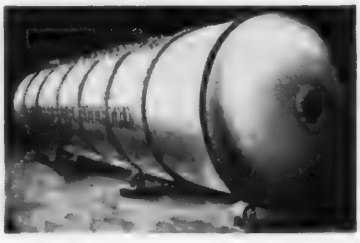
For rapid and accurate determination of moisture in most solid foods. The meter may be calibrated for a direct reading in one substance, or supplied with charts and arbitrary scale for various substances, including:

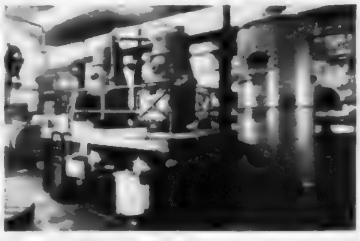
BARLEY • MALT • OATFEED • GROATS
SPLIT PEAS • TEA • LENTILS, etc., etc.

Write for Leaflet B105

BALDWIN INSTRUMENT COMPANY LTD. DARTFORD KENT

Telephone: Dartford 2948 (3 lines)



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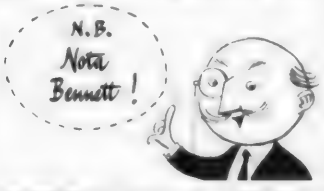
(CONTROLLED BY H. PONTIFEX AND SONS LTD)

FOR MANUFACTURING & PROCESSING PLANT IN STAINLESS STEEL, COPPER, ALUMINIUM, ETC.



BENNETT, SONS & SHEARS LTD., 9-13 GEORGE ST., MANCHESTER SQ., LONDON, W.1 WELBECK 8201 (6 LINES) WORKS: BIRMINGHAM, LEEDS, LONDON

THESE GATES ARE WIDE OPEN
to these kind of thieves!

Flour beetle.
Actual size approx. 4 mm.

Cacao moth larva.
Actual size approx. 11 mm.

Locked gates won't keep out the insects that invade your stocks of flour, cereals and other foodstuffs. More effective means are needed to guard against these greedy marauders—

A "Pybuthrin" Insecticide is the answer

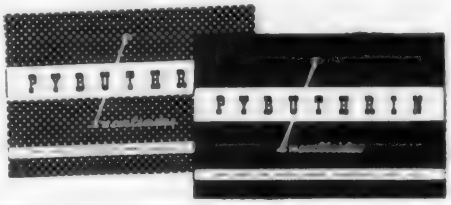
PYBUTHRIN is a mixture of piperonyl butoxide and pyrethrins. It is the active principle of a range of potent, easily applied insecticides, which are safe to use in the presence of foods, yet produce a much greater kill than preparations containing an equivalent amount of pyrethrins alone. Different formulations and methods of application may be required for different insects and circumstances Write for a copy of the booklet listed below which applies to *your* business.

"Pybuthrin" Insecticides for :—

1. *Pests of Cereals & Cereal Products*
2. *Pests of Cocoa Beans, Chocolate, Nuts, etc.*

PYBUTHRIN

(containing African pyrethrum synergised with piperonyl butoxide)



COOPER, McDOUGALL & ROBERTSON LIMITED, BERKHAMSTED, HERTS · Est'd 1843

A little goes a long way . . .

. . . particularly true in the food manufacturing industry where even the smallest amount of dust can spoil a large batch of the product.

The increasing insistence on spotless conditions in food processing works, demands close control of dust at all sources at which it might arise.

This calls for specialised knowledge in the design of extract hoods and systems in order to avoid the extraction of too much air with consequent heat loss in winter. It also requires the efficient collection of the dust at the end of the system to prevent any nuisance to the neighbouring locality.

Tilghman's Dust Collectors can be designed to operate continuously and fully automatically, thus eliminating the human element as far as possible and giving efficiencies of well over 99%.

If you have any problems in this direction, please contact us and we shall be glad to place our many years experience at your disposal.

TILGHMANS LIMITED

DUST & FUME CONTROL DIVISION

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LONDON OFFICE: 1 CHESTER STREET, S.W.1. Sloane 0651
AGENTS:
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W.80

MARINOL

TRADE MARK

You're *safe* with MARINOL

An ideal bactericide

- ★ Non-toxic
- ★ Non-irritant
- ★ No more corrosive to natural rubber, metal or plastics than water
- ★ Odourless and deodorant

When preparing food and drink for the public mere cleanliness is not enough.
The scientist knows the enormous range of bacteria and fungi that can cause trouble.
You only need to know the remedy—MARINOL.

Full particulars from :

BAYER PRODUCTS LIMITED
Neville House, Kingston-on-Thames, Surrey

Associated export company : WINTHROP PRODUCTS LIMITED

EDWIN DANKS

SPECIAL VESSELS

FOR EVERY INDUSTRIAL PROCESS

including:

VULCANIZERS

DE-VULCANIZERS

VERTICAL AND HORIZONTAL MIXERS

REVOLVING KIERS

HARDENING CYLINDERS

HEAT EXCHANGERS

The illustration shows a Steam Jacketed Mixing Pan 4′ 6″ diameter by 5′ 0″ deep, fitted with stirrer gear operated by electric motor and reduction gear. This type of mixing pan can be made in any size to satisfy special requirements and working conditions. Vessels of the same design are supplied with or without steam jacket, or, alternatively, fitted with internal steam coils.

Manufactured in mild steel, stainless steel or mild steel with integrally clad material of stainless steel or monel.

OTHER MANUFACTURES:
Edwin Danks High Velocity Economic Boilers and all other types of Shell Boilers, complete Boiler House Installations, "Oldbury" Chain Grate Stokers, Structural Steel-work.

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OLDBURY NEAR BIRMINGHAM

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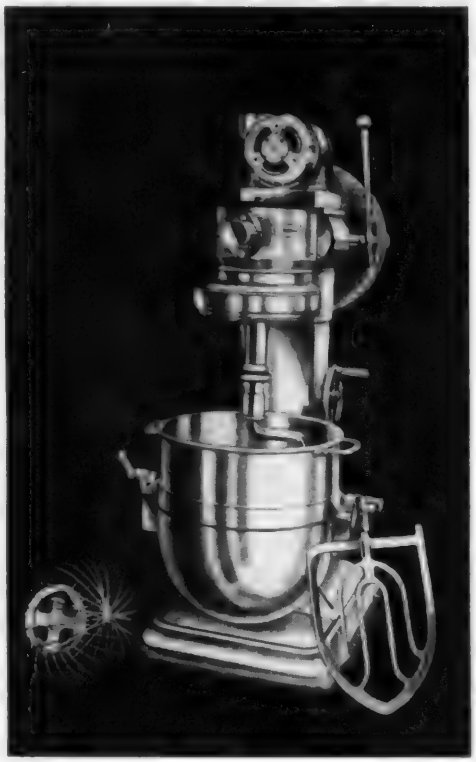

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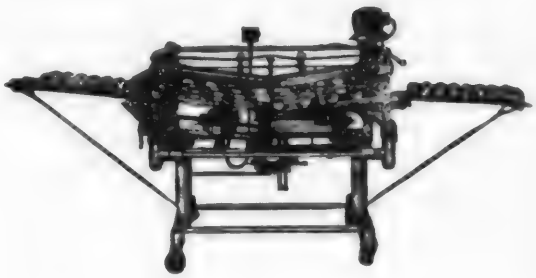

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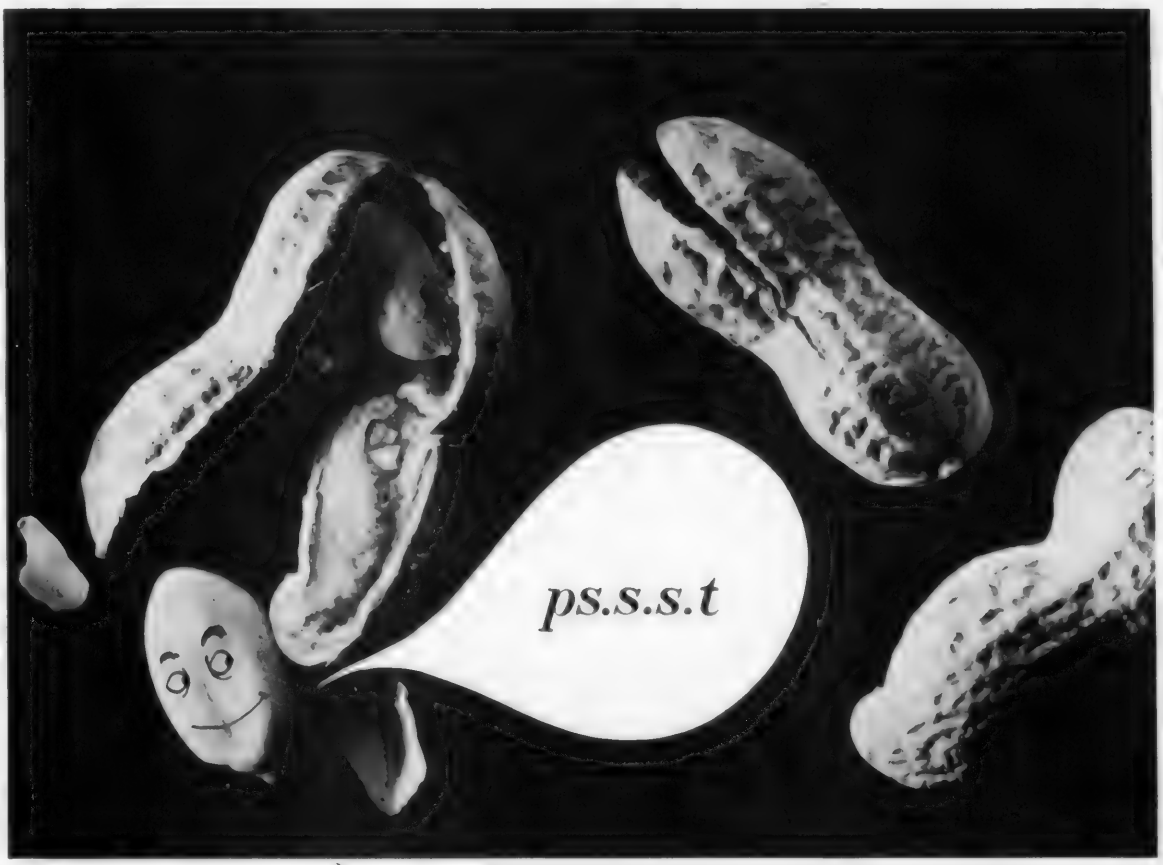

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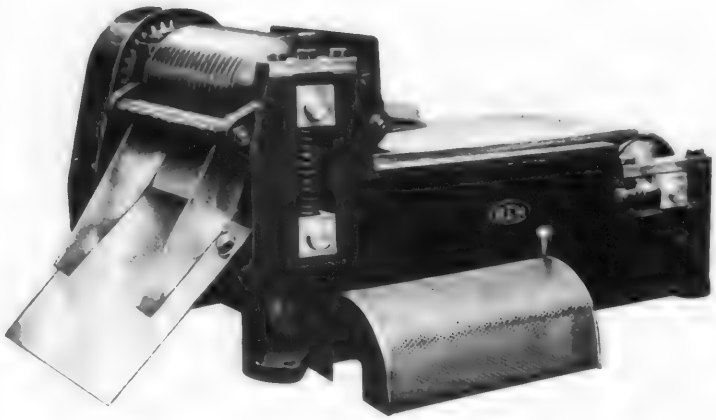

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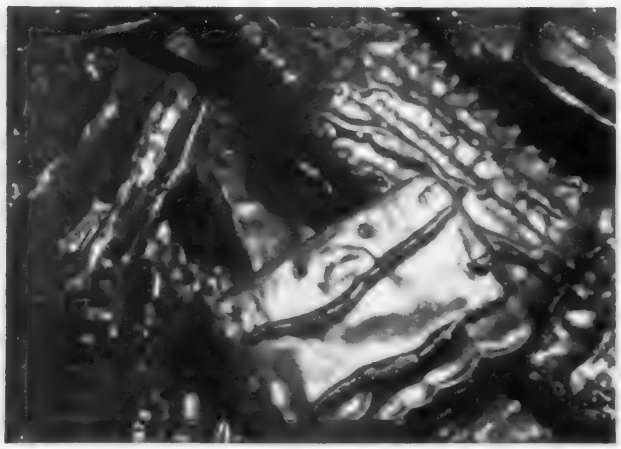

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FOOD MANUFACTURE

Vol. XXX. No. 8 · Published Monthly · August 1, 1955

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FOOD MANUFACTURE

Vol. XXX, No. 8 August 1, 1955

Radiation sterilisation

THE formation at Harwell by the U.K. Atomic Energy Authority of a Technological Irradiation Group charged with the development of industrial uses for waste fission products from atomic reactors raises again the question of the employment of these radiations for the preservation of food. Indeed, the prospects of using this "cold sterilisation" for foods were put forward as one of the principal industrial possibilities of ionising radiations when the establishment of the new Group was announced. A long and exhaustively documented appraisal of these possibilities has just been published by the D.S.I.R. with the title "Scientific and Technological Problems Involved in Using Ionising Radiations for the Preservation of Food" (H.M.S.O., 7s. 6d. net). The author is a leading British expert, Dr. R. S. Hannan of the Low Temperature Research Station. Although the report reveals no new developments, it has the great virtue of being a convenient summary of the whole vexed problem of employing radiations either generated from electron machines or from fission products for the sterilisation of foods.

The report recalls that the advantage of irradiation over the use of heat in destroying organisms which would bring about decay is the fact that the rise in temperature of the treated foodstuff is slight. As with canning, the sterilisation process is carried out after packing has been completed so that recontamination is avoided and the process can be adapted with ease to continuous production.

But no early solution can be seen to the many formidable difficulties of using this form of food sterilisation. Problems of flavour deterioration, change of colour and loss of texture are still present. Nor is it certain that chemical changes occurring during the radiation process do not form toxic or harmful substances, though the report says there need be no fear of actual radioactivity in foods. There is, however, the danger that vitamins or other beneficial components may be destroyed. Furthermore, ionising radiations, even at very low dosages, are carcinogenic when applied to animals and it is still not clear if this effect would be transmitted to the consumer of irradiated foodstuffs.

What would appear to be the most formidable problem of all still awaits full consideration. Assuming that cold sterilisation becomes feasible, what will be the general public reaction to it? To the public, radioactivity has too many sinister implications to be easily acceptable as a food manufacturing process. Thus to the technological problems of the process are added psychological complications. It would not be surprising if eventually it is decided hardly to be worth while.

Compressed confectionery

NOVELTY confectionery tablets which change their taste and colour during the time they take to dissolve in the mouth can be made by a new dry method of press-coating tablets. A confection with an effervescent core and a flavoured outer layer or *vice versa* is another possibility. The process is primarily intended as an alternative to sugar-coating medicinal tablets by the present laborious revolving pan process, which calls for skilled labour and is unsuitable for tablets containing hygroscopic substances.

The new process was described in the March and April issues of our associated journal *Manufacturing Chemist* by the two British companies concerned with the development of compression coating machines. At first the companies, Evans Medical Supplies Ltd., and Manesty Machines Ltd., collaborated with each other but later they developed their ideas separately. Manesty have produced the *DryCota* while Evans have licensed Kilian and Co. G.m.b.H. of Cologne, to make their machine which is called the *Prescoter*.

The idea of compression coating is not new. The first British patent for the process was taken out by Parker Newitt Noyes in 1895. He described a machine that was intended to carry out mechanically the process of tablet coating by sandwiching a tablet between two layers of dry sugar and compressing to produce a capsule of sugar encasing the tablet. Then in 1917 another patent was granted in the U.S.A. for "mechanically applying and compressing a powder, as sugar, upon the faces of previously prepared tablets, as chewing gum." In 1935 the Delong Gum Co. of Massachusetts was granted a

British patent for pressing a coating consisting of sugar, glucose, flavours and colours on to chewing gum.

None of these inventions completely solved the essential problem of perfect centring but in 1937 the German firm Kilian took out a British patent for a method of centrally positioning the core. The process was suggested for coated coffee tablets, bakers' tablets and tablets for use by diabetics where the coating may be lactose instead of sugar, and was recommended for coating materials affected by moisture.

Today's machines were developed mainly for pharmaceutical use, but it seems possible that many new forms of confectionery could be made on them, particularly where deliquescent and hygroscopic materials are involved. The process may also be useful in making tablets used for beverages. Compression coating should be more economical than pan coating irrespective of the size of the confection. In pan coating the hourly output is dependent on weight and it takes longer to produce a given number of large tablets than the same quantity of small ones. With compressing coating, on the other hand, size has no bearing on the output. We understand that British, German and Belgian confectionery manufacturers are already interested in compression coating.

Bleach in soft drinks bottles

"ACTING INNOCENTLY" is very little defence in English law as two manufacturers of a domestic bleach found recently when they were accused of packing their product in bottles embossed with the marks of a well-known soft drinks manufacturer. They were fined £44.

The defendants in this case were prosecuted under the Merchandise Marks Act for applying false trade marks and a false trade description to their bleach. While it would be ridiculous to assume that they were trying to pass off their bleach as, say, lime juice, the misuse in this way of branded bottles is most undesirable, and the National Association of Soft Drinks Manufacturers was right to bring the action.

Counsel for the prosecution argued successfully that it was unnecessary to prove intention to defraud, nor was it a defence even that a prominent label indicating the product and its proprietors had been fixed to the bottle: the language of the Statute was clear and as soon as the bleach was put in the bottle a false trade mark or description was applied.

The defence claimed that it had never been established that the protection given by the Merchandise Marks Act extended to goods of a different description from those in respect of which the trade marks were registered. Bleach was not a soft drink, argued the defence and so trade marks in respect of soft drinks had no application in respect of bleach. If the prosecuting counsel was correct, the defence averred, it would be illegal to fill a bottle with any material—even sand.

It is as well that the defence was unsuccessful. Leaving aside any questions of danger to the public, a bottle embossed with a well-known brand and used as a container for an entirely different product reflects no credit on any of the parties concerned. If the manufacturers of this particular bleach did not mind putting up their product in such an obviously makeshift package, that was their own affair. To associate a nationally known soft drink with it is quite another matter.

Co-operative cannery

THE largest pineapple cannery in the southern hemisphere—last year its gross sales were worth £4.5 million—is on the site of what was ten years ago a mosquito-infested swamp. The site is at Northgate, a small suburb of Brisbane, Queensland. The cannery covers 35 acres, 9 of which are occupied by the factory.

The cannery is a co-operative enterprise owned by the pineapple growers of Queensland. Before 1946 these men were dependent for their sales on a number of small canneries and on the fresh fruit market. The small canneries could not cope in times of glut while prices in the fresh fruit market fell so low that the grower received little or no return. In 1946, 900 growers subscribed £126,000 and placed the matter in the hands of the committee of direction of fruit marketing which, with the technical and financial backing of the Queensland Government, set about draining the swamp.

By the following year a factory worth £500,000 was completed and Australian-made machines were installed. Within 15 months the first £1 million of turnover was reached. Within another year, Canada alone was buying $2 million worth of pineapples from Northgate.

The factory has its own can-making plant with an output of 318 cans per min. The whole process of canning, from the time the pineapple arrives in a railway truck till it leaves the factory as a cartoned product, takes 31 min.

Although pineapples are the principal fruit processed, jams, jellies, conserves, juices, cordials, bananas, chutney, tropical fruit salad, papaws and other delicacies are also canned. Recently the growers decided to market pure pineapple juice in bottles instead of in cans. This was the first appearance on the Australian market of bottled fruit juice and the experiment seems to have been a success as

sales are now exceeding a million bottles a month in Queensland alone. By-products are being investigated by the factory laboratory. These products include citric acid from pineapple juice, sugar from waste juices and stock fodder from pineapple residue.

Of the total pack 85% is now exported—75% to the United Kingdom and the remainder to Canada, New Zealand, India and other parts of Asia.

How the Dutch defeat cheese mites

MUCH less mite infestation is seen on Dutch cheese than is normally found on cheese in store in either New Zealand or the United Kingdom. This is not because of natural protection—the same pest species are present in the Netherlands, and temperatures and humidities are even more favourable for their increase. The reason is better store treatment. Reporting on this in "Pest Infestation Research, 1954," the Director of the Pest Infestation Laboratory states that in particular, regular oiling and brushing of the cheese surface during storage makes mite build-up impossible, while mechanical scrubbing and waxing give increased protection during transport. The Dutch use dried pigs' bladders for the protection of cheese being exported to the tropics. The bladders are soaked, applied to the cheese, trimmed, and dried out again to form a complete seal over the surface.

The P.I.L. concede that this is probably the most efficient method at present in commercial use for the protection of cheese against mites but think that as it requires costly and tedious manual work its scope is limited.

Sweet poison

DRUGS disguised as sweets are causing an increasing number of deaths among young American children. The American Medical Association reports that among preschool-age children, drugs are responsible for 33% of fatal poisonings. Infant mortality rates from poison are four times higher in the United States than in England and it is thought that the growing trend to disguise potent medicines as sweets is a possible contributory factor.

Twenty years after their first appearance in the U.S. mass-produced candy medicaments now constitute as much as one-third of the annual volume of vitamin sales. Antibiotics, anti-epileptics, antihistaminics, barbiturates, sulphonamides and salicylates as well as vitamins are all available as candy medicaments. They are dispensed as heart-shaped candy tablets (anti-epileptic), lollipops and chewing gum (aspirin), rock candy (barbiturate), fruit-flavoured syrups (sulphonamides), and as a food additive in the form of a dispersible chocolate-flavoured powder (antibiotic) and orange-flavoured granules (vitamins) for addition to milk or cereals. Vivid colours as well as variety and sweetness are employed in order to make the drugs attractive to children. This certainly achieves the primary object of candy medication—namely the ready acceptance of medicines by sick children—but it unfortunately leads to children wanting to eat the sweet tablets and flavoursome liquids when they are well again.

Ignorance, carelessness and ready access to a harmful drug are blamed by the American Medical Association for most accidents.

They admit the problems of manufacturers in producing label instructions and protective devices effective enough to combat consumer apathy while being sufficiently inexpensive to remain acceptable. However, they warn that a basic cause of carelessness and negligence is the advertisement that implies a degree of safety not associated with the drug.

Fortunately we do not have the same problem in Britain and it is to be hoped that the American experience will deter any trend towards the harmful confusion of confectionery and medicines.

Home cookin'

FIGHTING words were spoken by Mr. Roy Kelley, chairman of the Shredded Wheat Co., when announcing his firm's entry into the cake mix business. "We intend to dominate the market," he said. "This is a coats off operation." What is the prize which stirs up this excitement? It is a market which, beginning here only 18 months ago, is now thought to be worth £2 million a year and which is estimated to rise to £10 million a year by 1960. With an eye on this and on current trends in America (last year 135 million dollars were spent on 350 million packets of cake mix) Shredded Wheat are bursting into the cake mix business with a range under the brand name *Mary Baker*, a six figure advertising appropriation for the next six months, and the fighting determination expressed by Mr. Kelley.

Shredded Wheat tell us that they conducted a market survey before launching into cake mixes and found that although at present there is a certain sales resistance, sales have in fact increased by 43% in the past few months. The number of cakes baked at home is 16 million a week compared with 10 million bought from the shops. The consumption of margarine, lard and compound cooking fats has climbed from 385,000 tons p.a. to 642,000 in 1953, the latest full year's figures available. Similarly flour consumption has gone up by more than 1 million tons p.a.

One of the discoveries of the survey was that

although it is her almost passionate desire to bake an excellent cake, the British housewife frequently uses disproportionate amounts of ingredients. Two hundred housewives who claimed they could make a good cake were invited to send a sample. These 200 cakes were submitted to a panel of experts and in every case a major fault was found.

The survey also disclosed that there has been a gradual swing away from plain type cakes and that the public is rapidly taking more readily to chocolate, ginger and other cakes with a pronounced flavour. Ninety-five per cent. of the women interviewed also said that they preferred to add a fresh egg when using a mix. This is in keeping with the American trend.

Dog's delight

THE traditional British fondness for pets is profiting a number of food manufacturers as specially prepared animal foods become more popular. In the U.S. sales of dog food reached $250 million last year—over double the 1947 figure—and it seems quite likely that a similar increase will take place in this country.

Specially packed food for pets is a logical extension of the trend which is becoming general for their owners. Packed, pre-cooked foods prepared for immediate consumption with the minimum of waste naturally mean less scraps for the household pet so that he too, must have his special pack.

Dog biscuits, of course, have been made for many years, but canned pet foods originated just after the first World War when an enterprising horse-trader bought a quantity of horsemeat from the French Army and sold it as canned dog food. Frozen pet foods have now made an appearance in America.

Dogs and cats require the same range of elements, proteins, carbohydrates, fats, vitamins and minerals in their diet as humans, but apparently animals softened by domestic life only eat those foods that they particularly like whether it is good for them or not. So although formulating a nutritionally balanced pet food is comparatively easy, making such a product palatable is more difficult. Since odour and flavour are very closely connected and the dog's sense of smell is so highly developed, strongly flavoured ingredients such as cumin, garlic and onion have proved very acceptable in a number of dog foods, which presents another problem: preparing a pet food which is not objectionable to the human owner.

Formulators of these products must envy the accommodating although expensive tastes of the pet elephant kept by James I which enjoyed a daily ration of a gallon of wine.

Bottled bubbles

THE THIRSTS of summer prompt thoughts of fizzy drinks and remind us that although the Americans probably consume more bottled CO_2 than any other nation, it was two European chemists who championed the cause of "mineral" waters.

It was the chemist Hoffman who anticipated our youngsters' delight when he told of soda-water's "penetrating Nature affording a grateful Odour of its Exhalations, and filling the whole head therewith." All of which was a Third Programme manner of putting it. We prefer a small girl's succinct version of the "pins and needles" effect of CO_2 bubbles on palate and tongue. "It tastes," she said, "like your foot asleep!"

Even more interesting was the way in which Joseph Priestley became the father of mineral waters. Inspired by the CO_2 from a nearby brewery, Priestley not only fathered pneumatic chemistry by generating the gas from marble and acid and studying its properties; but he also gave "Directions for Impregnating water to give it the peculiar Spirit or Virtues of Pyrmont." "I do not doubt" he added "that by the help of a condensing-engine the water might be more highly impregnated."

The Pyrmont Spring was then the ideal rather than that so often quoted from Pope: "Drink deep, or taste not the Pierian Spring." Gone now are the heydays of spas like Pyrmont, Aix, Selters, Vichy and the historic Apollinaris in the Ahr Valley where once 40 million bottles were carbonated to a higher CO_2 content and exported each year. The soft drink industry came to vie with and eventually outstrip natural effervescent waters, once CO_2 or Spiritus Sylvestris from burning wood was found to be different from ordinary "air," as believed by such men as Dr. Springfield (who with such a name should have done better!)

Although our country had no Vichy or Selters, one or two fragments were contributed to the story apart from Priestley's vital chapter. It is not every country that can provide such a sign of declining spas as a once white Spa Hotel converted to the business of a coal merchant. Nor can every metropolis boast a Flask Tavern like that at Hampstead "Wells" where once carbonated waters were bottled at threepence a flask by the apothecary Phelps. Before the later decline and fall of Hampstead the place flourished under the energetic John Driffield, though his success was due more to bowls, beer gardens and gambling places, just as one-time Epsom Spa had turned to gambling before the Derby was thought of. Today, beer gardens and brewers rely also on bottled "windy" drinks, worthy successors to "Artificial Pyrmont" and "Mr Bewley's Julep."

PROBLEMS OF CABBAGE DEHYDRATION

By E. G. R. Gooding, M.A., M.I.Biol.

(*Ministry of Food Research Establishment, Aberdeen*)

Cabbage is the traditional "second vegetable" of the English diet, and a valuable source of ascorbic acid (vitamin C). During the last war the fighting services used large quantities of dehydrated cabbage, and even when ascorbic acid became freely available in tablet form, the demand for dehydrated cabbage was maintained. At the present time the demand for dehydrated cabbage is comparatively small, but the possibility still exists that large scale production may again be required for defence purposes, and research continues as an insurance against the possibility.

THE dehydration of cabbage follows the general pattern for most vegetables. Raw material of a suitable variety is trimmed, cored, cut into shreds, thoroughly washed, scalded for 2-3 min., sulphited, cooled, and dried by one of the conventional methods. The product is packed in an inert gas (usually nitrogen) in sealed cans. Dehydrated cabbage combines many of the desirable attributes of this type of foodstuff: reconstitution is rapid, since 10-20 min. gentle boiling in water suffices for reconstitution and cooking; when cooked it closely resembles the freshly cooked vegetable; the nutritive value is well maintained, the ascorbic acid content being similar to that of fresh cabbage cooked under good conditions.[1] The flavour is generally considered to be satisfactory, though critical tasters sometimes detect a slight foreign taint. The reductions in both weight and volume are great: cabbage contains 90-94% water, and the dehydrated shreds, although loosely packed, occupy only a small fraction of the bulk of the raw material. Even when packed in 4 gal. cans in cardboard cartons, there is a reduction in weight of 11:1 and in volume of 7½:1 compared with the raw vegetable: when the dehydrated cabbage is compressed, as it can be, these figures are increased to 18:1 and 38:1 respectively.[8]

The reduction in volume of cabbage by dehydration. 100 lb. raw cabbage, after trimming and processing, yields approximately 5 lb. of dehydrated shreds, which can be packed in one 4 gal. can with a capacity of 1,145 cu. in. (*on right*). Compression further reduces the volume and the same quantity of material may be packed in two "3 lb. flat" cans, with a total capacity of 163 cu. in. (*on left*).

Unsatisfactory features of dehydrated cabbage are: firstly, that by the time the dried shreds have travelled long distances to reach the consumer there may be excessive fragmentation; secondly, that there may be wide variations in the initial quality of the product, and thirdly, that, as with most other dehydrated vegetables, the storage life at 100°F. is short —until recently extending to only about three months, the development of non-enzymic browning being the limiting factor.

The elimination of these faults is the main object of the current research at Aberdeen, with particular attention to the improvement of storage life under tropical conditions. A recent revision of the specifications for materials supplied to the Services reduces the maximum permissible moisture content from 6% to 5%, and this will undoubtedly increase the tropical storage life, but much remains to be done before the goal of "two years storage life in any climate" is achieved.

In the course of the work at Aberdeen, a great deal of general data on plant operation, quality control and the factors influencing losses and yields have been obtained, and while the following paragraphs will be mainly concerned with the influence of various factors on the quality of the product, other findings will be mentioned where relevant.

The raw vegetable

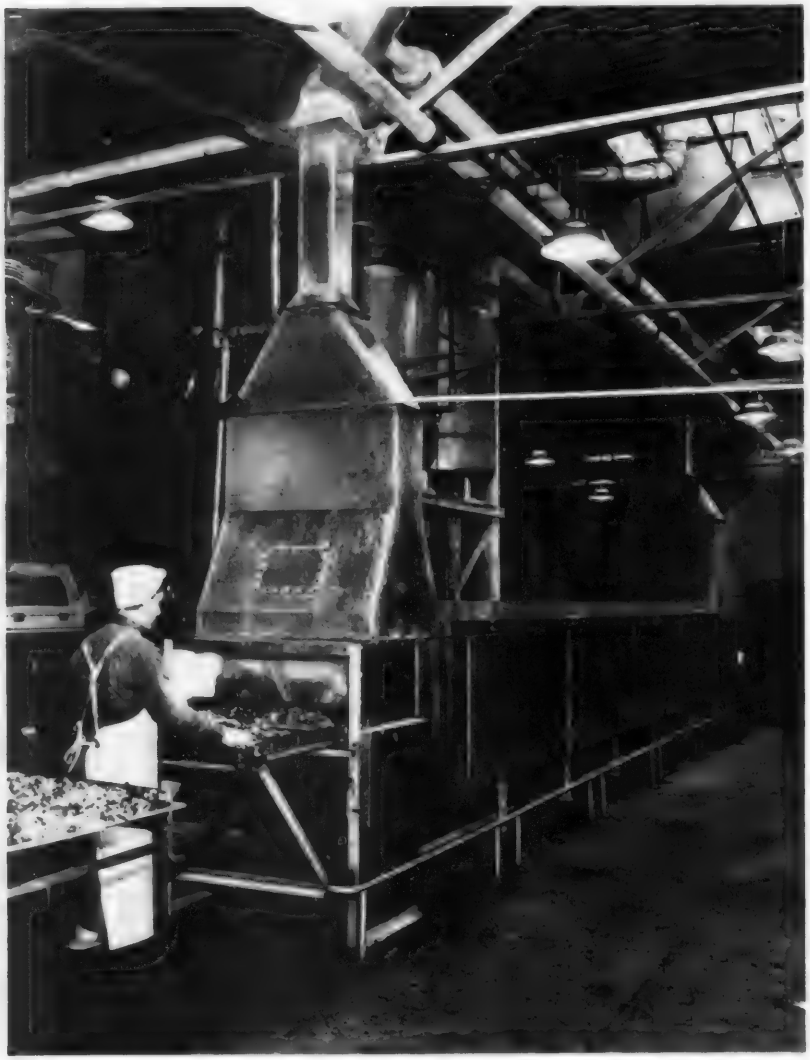
There is still little knowledge about the suitability of different

varieties of cabbage for dehydration. The rough criterion still is that a cabbage which is of high eating quality would generally be suitable for dehydration: coarse cabbages with fibrous leaves give hard and fibrous products, and the large hearted "cow" cabbages of winter give an anaemic-looking and, to British eyes, unattractive, pale product.

Table 1.—Dry Matter Content of Raw Cabbage and Yield of Dehydrated Product

Variety	*% Dry matter in raw cabbage*	*Approximate Average Yields*	
		Expressed as % of raw vegetable	*Production ratio Wt. raw vegetable / Wt. dehydrated product*
Copenhagen Market	6·4- 6·7	3·1	32 : 1
Early Ironside ..	6·9- 7·4	4·6	22 : 1
Winningstadt ..	9·1-10·2	6·2	16 : 1
Rearguard ..	10·2	6·4	16 : 1

In the current season a number of varieties, grown under similar conditions at the Scottish Horticultural Research Institute, Invergowrie, Dundee, are being processed, and attempts are being made to assess their qualities as raw materials for dehydration. There are quite distinct varietal differences in the solids content of the cabbages and these are reflected in the yields of dehydrated product: an indication of the effects found is shown in Table 1: the varieties listed all came from the S.H.R.I., Invergowrie, except Copenhagen Market, but this is included since it is well known as a "low solids" variety and gives some idea of the very low yield to be expected when dry matter contents are low.



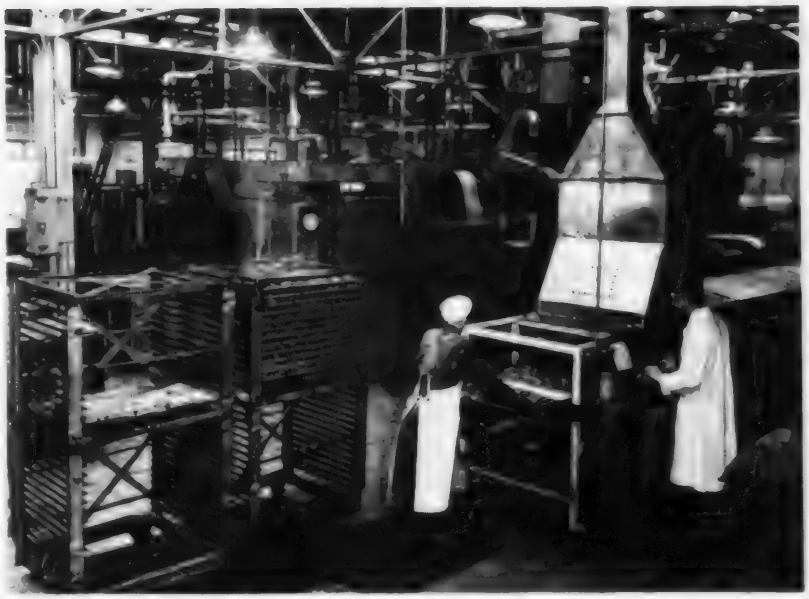
SCALDING. Shredded cabbage on trays being fed into a continuous steam scalder. The stainless steel tanks (upper centre) hold under pressure the solutions which are sprayed on to the vegetable during scalding.

Figures of this type are affected by trimming losses, which may vary greatly according to the condition in which the cabbage is received, and more reliable data are obtained by comparing the yields from "trimmed" rather than "raw" cabbage. But to the manufacturer it is the overall ratio, as shown in the table, that is important.

It is not necessarily true to say that the cabbage with the highest solids content is the best for dehydration. If the high solids are due to a high proportion of fibre, the product will probably be coarse and unsatisfactory. A high proportion of certain solutes may affect the storage life at high temperatures. Some varieties may behave differently during dehydration from others—for example, limited experience in the current season suggests that Greyhound tends to discolour (brown) more readily during dehydration than does Winningstadt with similar solids content: there may also be seasonal differences in this respect. Storage tests on the dehydrated product from different varieties are being laid down: it will be many months before the results of these can be known.

Small scale experiments in 1951 and 1952 showed varietal differences affecting the behaviour of dehydrated cabbage on compression; while some varieties fragmented severely, others fragmented little. Differences in ascorbic acid content seem to be more affected by season than by variety, and a recent survey[5] has shown that for a number of varieties maturing at different times of

the year there is a very striking rhythm in ascorbic acid content. In spring cabbages (May and June) the ascorbic acid content was at the highest level of 700-900 mg. 100 gm. (on a dry weight basis) and there was a steady fall throughout the season until in the winter cabbages, mainly Savoys, (January to March) the average value was only 300-400 mg./100 gm. Obviously these differences will be reflected in the ascorbic acid content of the dehydrated products.



READY FOR DEHYDRATION. Scalded cabbage shreds emerging from the steam scalder, and being loaded on to trolleys for dehydration in the three cabinets shown in the background.

Scalding conditions

During scalding in water, soluble materials are leached out from the cells of the vegetable and accumulate in the scald liquor. The concentration of soluble solids in the scald liquor tends to rise to a steady maximum in which the rate of leaching is balanced by losses of the liquor by overflow, etc., but the concentration can be reduced, if desired, by running in extra water or by changing the liquor frequently.

The war-time observation that scalding in liquor of high soluble solids concentration led to dulling of the colour of dehydrated cabbage has been confirmed, though if the *p*H of the scald liquor is maintained at about 7·5 a satisfactory colour can be obtained with soluble solids levels up to about 1·5%. The *p*H alone is not responsible for maintaining a good colour; cabbage scalded with no sulphite or with only low levels of sulphite, was of very poor colour even if scalding was carried out at a *p*H of 7·5-7·8. Freshly dehydrated cabbage without sulphite, or with very low sulphite content, more closely resembled the fresh, cooked cabbage in flavour than did dehydrated cabbage containing larger amounts of sulphur dioxide, although until relatively high contents were attained (*ca* 2,500 p.p.m.) the flavour of sulphur dioxide as such could not be distinguished even by the more sensitive tasters.

The sulphur dioxide content of the product is determined by the sulphur dioxide content of the scald liquor, but the relationship is neither linear nor simple. With rising sulphur dioxide content in the scald liquor the sulphur dioxide content of the product rises disproportionately. It has not, however, yet been possible to assess the relationship accurately since complications are introduced by other factors. It has been found, for example, that as the soluble solids content of the scald liquor rose, the sulphur dioxide content of the product also rose, although the sulphur dioxide content of the scald liquor (as measured by direct iodine titration) was maintained at a constant level. In order to avoid this trend during the course of a run it has been found necessary to allow the sulphur dioxide content of the scald liquor to drop by about 10% in the period when the soluble solids content was rising to about 1·5%.

A second factor that must be taken into consideration is suggested by a number of observations which showed that for any particular concentration of sulphur dioxide in the scald liquor, cabbage of high dry matter content yielded a product containing a smaller proportion of sulphur dioxide than did cabbage of low dry matter content. An experiment in the 1952-53 season may be cited as an example. Two varieties of cabbage were processed in the same run and with the same sulphur dioxide content in the scald liquor. Variety (*a*) with dry matter of 6·4% yielded a dehydrated product with sulphur dioxide content of 2,000 p.p.m.: variety (*b*) with dry matter of 9·9%, yielded a product with sulphur dioxide content of 1,390 p.p.m.

Beyond these factors, which are now becoming fairly well established, still others operate: variations, which at present seem to be unpredictable, may occur from year to year when the same variety of cabbage, with similar dry matter content, needs quite different levels of sulphite in the scald liquor to produce the same results in the finished product. Different varieties may require slight differences in scalding time, and there may be differences associated with the degree of maturity of the cabbage, the conditions of growth or the time of harvesting. Data on these points are still inadequate.

The effect of the concentration of leached out solutes in the scald liquor on the colour of the product has already been mentioned. Quite

small differences in soluble solids content are reflected in large differences in yield. In seven runs during the 1952-53 cabbage season an increase in soluble solids content from approximately 0·7% to approximately 1·4% gave an average increase in yield of dehydrated material of some 13%. Although this increase in yield was presumably the result of reduced leaching during scalding, little difference was found between the ascorbic acid content of dehydrated cabbage produced at the lower and at the higher soluble solids levels (Table 2). The overall loss of ascorbic acid during the whole dehydration process was about 40% of the original quantity.

For some years small scale experiments have been carried out on scalding in steam as an alternative to the water scalding that is usual in this country, and for the 1954 cabbage season a full scale steam scalder was designed and completed, and a comparison of steam scalding and water scalding on the large scale was undertaken. At the time of writing full results are not available, but preliminary observations show that:

(1) processing losses are substantially lower with steam scalding than with scalding in the usual type of rotary water blancher. While a considerable part of this difference is due to the reduction in leaching obtained by steam scalding (the leaching losses appear to be 3-5% in steam scalding and about 15% during scalding in water containing 1·4-1·5% soluble solids), some of the improvement is due to avoiding the mechanical loss of fragments through the meshes of the rotary scalder.

(2) control of sulphiting in steam scalding is difficult, but it does not appear to be an insuperable problem. The existing arrangement at Aberdeen is for the dosing solution to be sprayed from high pressure jets on to the upper surface of the cabbage, which has already been loaded on to the drying trays. Spraying may be done at a number of positions—shortly after the vegetable enters the scalder, about half way along the scalder, just before the exit or just after the exit. The most satisfactory results appear to be when the spray is applied at the midway position. An improved colour has been obtained by including a small quantity of sodium carbonate along with the sodium sulphite spray.

(3) The colour of the steam scalded product is rather dull compared with that of material scalded in water at low soluble solids concentrations, but generally similar to that scalded at higher concentrations (1·4-1·5%). It has, however, frequently been somewhat patchy, as if the carbonate-sulphite sprays were not evenly distributed over the surface of the material.

Table 2.—Soluble Solids Content of Scald Liquor and Ascorbic Acid Content of the Product

Date	*Run and Batch No.*	*% Soluble solids in scald liquor*	*Ascorbic acid (mg. 100 g.)*	*Variety of cabbage*
9.6.53	71 7	0·54	693	McEwan's Early
	71 3	1·08	690	.. ..
	71 7	1·40	684	.. ..
25.6.53	75 2	0·60	532	McEwan's Early
	75 8	1·28	500	.. ..
20.8.53	81 1	0·20	318	Golden Acre
	81 9	1·43	298	.. ..
3.9.53	83 2	0·60	420	New Alpha
	83 20	1·45	367	.. ..
10.9.53	84 1	0·20	322	Copenhagen Market
	84 7	1·40	294	.. ..

COMPRESSION. Experimental cabbage compression unit. The illustration shows on the right, the pre-heater (with operator touching dial thermometer), and on the left the block press, with two moulds on a traversing table: one mould, containing the block now being made is hidden by the guard; the previously made block has just been ejected from the mould outside the guard. The operator on the left is controlling the hydraulic mechanism of the press.

One block of cabbage, approximately 6 in. diam. × ½ in. thick, weighs ½ lb. and is produced from about 10 lb. of untrimmed cabbage. The reconstituted and cooked material from one block is shown on the right.

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(4) the flavour of the steam scalded material is almost invariably better than that of otherwise similar water scalded material.

(5) accelerated tests have so far suggested that the steam scalded material is not likely to have a shorter tropical storage life than water scalded material.

Drying conditions

The three stage driers used at Aberdeen have been briefly described in a previous paper[3] and little difficulty has been found in consistently producing dehydrated cabbage of about 4% moisture content. The most important single factor in obtaining uniform drying was to use an accurately weighed quantity of the scalded cabbage on each tray (weighed to ± 1 oz. in a tray load of 4 lb. = 1·14 lb./sq. ft.) and to spread the material in a very even, loose layer over the tray. Increasing the tray load led to frequent wet patches in the product and to browning. The latter effect seemed to be due to the fact that the higher tray load resulted in a lower rate of drying in cabinet 2, and the material passed too slowly through the zone at which it was most sensitive to browning—*viz.* 15-25% moisture content.

The extent of leaching suffered by the cabbage during scalding has an effect on the drying conditions which the material will stand —the less heavily leached the material the more sensitive it is to heat damage during drying (resulting in browning), and the conditions to be adopted for drying have to be settled accordingly. When scalding was done in liquors containing not more than 1·5% soluble solids, the conditions found suitable were 30 min. drying at 205°F. dry bulb and 135°F. wet bulb; followed by 140 min. at 170°F. dry bulb and 125°F. wet bulb and 140 min. at 150°F. dry bulb and 90°F. wet bulb. When steam scalding was used conditions had to be eased to 30 min. at 205°F. dry bulb and 135°F. wet bulb, followed by 140 min. at 160°F. dry bulb and 122°F. wet bulb, and 140 min. at 145°F. dry bulb and 85°F. wet bulb. Completing the dehydration in bins, either shallow or deep, has been found entirely practicable and to give satisfactory results. Cabbage taken from the main driers at 10-12% moisture content can be dried in a deep bin to 3% moisture content in 4-6 hr. at 130-135°F. dry bulb and 80°F. wet bulb; longer periods are required for cabbage of higher moisture content, and the deep tray type of through draught drier (a series of trays each about 6 in. deep, one above the other), in which the cabbage may be raked over at intervals, is desirable for handling material of this kind if wet patches are to be avoided in the product.

Storage life

Under cool or temperate conditions dehydrated cabbage prepared to current specifications, packed in leak-free cans in an atmosphere of nitrogen, maintains its appearance, palatability and nutritive quality for two years or more. Under tropical conditions, however, the storage life may rapidly be terminated by the familiar browning reactions. The rate at which browning occurs is affected by the moisture content and the sulphur dioxide content of the cabbage. It may be affected by the soluble solids content, but all experiments designed to study this have so far given no indication that such is the case within the range likely to be encountered in commercial practice.

Effect of moisture content

Recent experiments have confirmed that the storage life of dehydrated cabbage is greatly improved by lowering the moisture content. Whereas material of 7% moisture content was inedible after two-three months at 100°F. material of 5% did not become inedible until 5-6 months had passed, and reducing the moisture content still further to 3%, extended the storage life at 100°F. to 10-12 months.

Effect of sulphur dioxide content

Published data on the effect of sulphur dioxide content on tropical storage life are scanty, though it seems to be well established that the presence of sulphite in dehydrated cabbage does increase its resistance to browning.[2,5] Mainly on the basis of unpublished wartime observations, it has been generally accepted that, other things being equal, the higher the initial sulphite content of the dehydrated vegetable, the longer will be its tropical storage life. Recent experiments have given some cause to question this view: at low moisture contents (3-5%) the effect of differences of sulphur dioxide content in the range allowed by the existing specifications (1,500-3,000 p.p.m.) had little or no effect on the storage life of the product, and recent accelerated tests at higher temperatures are tending to confirm these findings: further long term tests have been started. It does appear, however, again

from accelerated test data, that reduction in the sulphur dioxide content to levels below 1,500 p.p.m. will materially shorten the storage life. It is also worthy of note that at low moisture contents the loss of sulphur dioxide from the dehydrated material when stored at 100°F. is very slow; it becomes increasingly rapid with increasing moisture content.

Compression

The necessity for reducing bulk to the utmost limit led, during the 1939-45 war, to the development of a process for compressing dehydrated cabbage into blocks. In order to avoid very severe fragmentation of the dehydrated product it was necessary to humidify the dried material up to a level of about 8%; the moist cabbage was then compressed in a mould by hydraulic pressure, and the blocks were subsequently dried in a current of hot air—this block drying taking 8-12 hr. The process was somewhat elaborate and the long drying period for the blocks led to some deterioration in quality.

Pilot scale experiments have been in progress at Aberdeen for some time, and it has been possible to produce blocks of cabbage of good quality without resorting to humidification and the consequent necessity for block drying. The essential feature of the new process is that many varieties of cabbage, even when dehydrated to moisture contents as low as 4%, become moderately plastic when heated to 140-150°F. provided that they retain a high proportion of their original soluble matter. Cabbage of these varieties, scalded in water containing only a low concentration of soluble solids, and therefore suffering heavy leaching, does not become sufficiently plastic for compression and fragments severely, but when scalded in liquor of high soluble solids content, or scalded in steam, can be compressed to give a satisfactory block with only a small degree of fragmentation.

In the compression process the cabbage is heated rapidly by a current of hot air to 140-150°F. and then quickly placed in a mould, also heated, and compressed by a heated plunger. (Contact with cold metal in a press rapidly chills the cabbage and causes it to lose its plasticity and become fragmented, particularly near the areas of contact with the metal). The precise conditions—temperatures, pressures, time of dwell, etc. are still being studied, but with the techniques at present used, blocks are produced having a density of about 0·9 gm./ml., which is about 8 times the density of the uncompressed material. It is too early yet to say what effect the heating before and during compression has on the storage life of the product, but it is unlikely to be severe and certainly should be less harmful than the long period of block drying employed in the earlier process.

Experiments to date suggest that there may be varietal differences in the behaviour of cabbage to compression: most of the common summer and autumn varieties seem suitable, but preliminary experiments on Spring cabbage and on Savoys suggest that these might present greater difficulties.

Vacuum contact plate dehydration

The application of the vacuum contact-plate method of dehydration,[4,7] to potatoes was described in a previous paper.[3] It has proved itself equally applicable to cabbage and the product is generally superior in colour to corresponding air dried material—the greens are brighter and the whites clearer. Evidence from a small number of storage tests suggests that the vacuum dried material will also have a longer tropical storage life. The slight compression given during dehydration forms the product into thin flat slabs instead of loose shreds, and results in a doubling of the packing density, allowing 10 lb. instead of 5 lb. of the dehydrated material to be packed in a 4 gal. can. Although the economics of the vacuum drying process compared with the air drying process have not been fully worked out, the reduction in packing costs is expected to go a long way towards off-setting the higher capital cost of the vacuum plant—though this would no longer be the case if compression were adopted for air-dried material.

Some of the more important problems of cabbage dehydration have been outlined above. The most important single problem is to increase the storage life at high temperatures, and considerable improvement has been shown by reducing the moisture content to the 3-4% level, which can be accomplished without special drying techniques. Compression experiments have been very promising and there seems to be good reason to hope that a sound technique will soon be developed. Steam scalding shows certain advantages over water scalding, particularly in respect of the increased yield obtained and the better flavour of the product, but much is yet to be learned about the technique of sulphiting, while an improvement in the colour of the product is still desirable. More knowledge is required, too, about the effect of scalding conditions, both water and steam, on the tropical storage life of the dehydrated material. Vacuum contact-plate dehydration is a promising technique which yields a product initially more attractive, and possibly of longer storage life at high temperatures, than the conventional air drying techniques.

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Processed Foods from Jamaica–New Standards Devised

By L. H. Greenwood-Barton, B.Sc., F.R.I.C., F.R.SAN.I.

(*Adviser on Food Standards to the Government of Jamaica*)

During the past 18 months Jamaica has taken important steps to improve the competitive power of its food exporters. Under the guidance of an adviser seconded from the Ministry of Food new laws controlling the standards of processed foods have been drafted and an organisation to enforce them has been set up.

IN the immediate post-war years food shortages persisted in the United Kingdom and rationing of many foods was retained. In those days the British housewife was glad to buy anything that would provide a change in the rather monotonous family diet. There is little doubt that in some of those purchases, particularly of imported canned fruits, she suffered considerable disappointment. Certain Jamaican canned products have always been of high quality, but processors who have always packed products of good quality have suffered because of the lack of care on the part of a few. During the last four years, however, canned fruits of better quality have appeared on the market and competition has become intense. The "seller's market" has now become a "buyer's market" and people are buying only products of good quality.

Long before this change occurred the Government of Jamaica had given serious consideration to the possibility of introducing standards for canned foods intended for export. It was fully appreciated that the time would come when more and better quality canned foods appeared in world markets and Jamaica's export trade in those commodities would survive only if they could compete favourably with similar products of other countries. Accordingly, by arrangement with H.M. Government, one of the staff of the Ministry of Food was appointed in January 1954 as Adviser on Food Standards to the Government of Jamaica, to assist the Government to establish standards for food products and an inspectorate to enforce them, and to advise manufacturers on how to improve their products and how to achieve the required standards. The Adviser is also expected to examine problems of developing new products and advise on the development of a research service. His activities are being financed under a Colonial Development and Welfare Scheme.

Check of standards legislation

At the outset it was clear that if official standards for foods destined for export from Jamaica were to be set up and enforced there should be statutory authority for so doing. This necessitated a systematic examination of the legislation on the statute book and a standards legislation committee, under the chairmanship of the Adviser, was set up for this purpose in May 1954. The committee was asked, in addition, to consider the procedure by which standards for food products are established in other countries and to recommend the procedure most appropriate for Jamaica. This required a knowledge of the methods used by countries who are known to be leaders in this field.

The Adviser, who was already familiar with the procedure followed in the United Kingdom, visited Canada and the United States in July 1954 and made a detailed study of the relevant legislation, and its administration and enforcement in both countries. Particular attention was paid to the Meat and Canned Foods Act of Canada, since the object of this act is to control the standards of processed foods exported from Canada. At that time it was believed to be unique in this respect, but in August 1954 South Africa published regulations under their Agricultural Produce Act 1917 (as amended) which define grades of marketing quality and state the provisions for the packing and marking of canned foods intended for export. It is known too that Malaya now has similar regulations in draft for canned pineapple. Apparently these countries too have felt the need to control the quality of their processed foods for export in view of the intense competition in world markets.

By January 1955 the standards legislation committee had completed its task and submitted its report to the Government. The committee showed that existing legislation was inadequate and recommended that new legislation be enacted which provided for the making of regulations specifying standards for processed foods intended for export, the appointment of inspectors with powers to enforce the legislation, the control of exports of processed foods, and adequate sanctions to ensure its satisfactory operation and enforcement. The committee recommended further that a new processed foods division of the Ministry of Trade and Industry, with its own appropriate staff, should be set up to administer the new legislation.

Important observations were also made by the committee on the subject of standard making. A procedure similar to that in Canada and the United Kingdom was recommended whereby a non-statutory food standards committee should be appointed by the Minister for Trade and Industry to advise him on the regulations to be set up under the new legislation. The standards legislation committee advised that no mandatory procedure should be laid down for that committee. This last provision was inserted in view of the experiences of the United States, whose mandatory procedure proved so ponderous and cumbersome that public hearings on their proposed bread standard lasted ten years and amassed a record

of 17,000 pages! (After sixteen years this procedure has now been largely dispensed with under the "Hale Amendment" to the Food, Drug and Cosmetic Act.)

It is of interest to note that in the course of the committee's deliberations the Adulteration of Food and Drugs Law of Jamaica, the law which should protect the consumer in Jamaica, was found to be based on the old 1875 Food and Drugs Act of the United Kingdom, with probably portions of an ancient Weights and Measures Act inserted for good measure! The committee drew attention to this deficiency and pointed out that the early food laws of the United Kingdom were concerned only with the narrow aspects of fraud and deceit, as might be employed in the sale of bread, tea and ale. They were far more concerned with the use of drugs as poisons than with their therapeutic value. Many changes had occurred during the present century: methods of analysis had vastly improved and the old days of gross adulteration of food had gone; new problems had arisen connected with the adventitious or deliberate addition of chemicals to food and the presence of filthy extraneous matter, and many new and valuable drugs had been discovered. A strong recommendation was made that the Adulteration of Food and Drugs Law should be revised at the earliest opportunity.

The Government approved the report of the standards legislation committee and asked for new legislation to be drafted. This has been done and a Processed Food Bill was expected to go before the House of Representatives in July this year. The first steps have also been taken with a view to the revision of the Adulteration of Food and Drugs Law.

Enforcing the new laws

The foregoing represents the progress that has been made with regard to legislation. What provision is being made to administer the new legislation? As soon as the new bill receives full statutory authority a food standards committee will be appointed and it will proceed forthwith with the task of formulating standards. It follows that an administration, with an appropriate field inspectorate must be ready to enforce the official standards on the date when the regulations become effective. During the period when regulations are being formulated a full administrative staff will not be required, but as the number of official regulations increases the duties of inspectors and administrative staff will increase and appropriate officers will be recruited.

Every effort is being made to recruit West Indians for the administrative staff and field inspectorate. Two science graduates will constitute the initial inspectorate and through the courtesy of the director of the marketing service of the Canadian Department of Agriculture, they will receive three months training in the inspection of processed fruit and vegetables in Canada this year. Through the courtesy of the director of the inspection and consumer services of the Canadian Department of Fisheries they will also receive one month's training in the inspection of processed shellfish in the north-east coastal areas of Canada. They will be accompanied by another member of the staff, a home economist, also a graduate, who has charge of the experimental kitchen. A highly qualified microbiologist (Ph.D. Yale) and suitable laboratory assistants and an appropriate secretariat have been appointed. Complicated chemical analyses will be carried out by the Government Chemist, but a small chemical laboratory will be set up for the use of inspectors.

Although no official standards have yet been formulated for processed foods exported from Jamaica, the Government has already received evidence that the standard of certain products exported in recent months has undergone a marked improvement. This is an encouraging sign and a sure indication that the processors in Jamaica are anxious to improve their products.

Cuban Colossus

Flowsheets of sugar refining processes and of alcohol production are combined with rolls of honour and family trees in a lavishly produced commemorative brochure issued by the Cuban Co. Jose Arechabala S.A., indicating the company's equal pride in progressive industry and family tradition.

The brochure is an English version of a Spanish edition published on the 75th anniversary of the company in 1953. It traces the development of a cooperage and distillery founded in 1878 by Don Jose Arechabala Aldama to the present large organisation which covers 148 acres and has a profound influence on the entire Cuban economy.

In 1953 the company owned a complete molasses plant and alcohol distillery, rum and liquor factories, a sugar refinery, raw and refined sugar warehouses, a confectionery factory and a syrup plant. The company runs it own shipyards, including a maritime terminal with docks, quays and facilities for handling the cargoes from six ocean-going vessels. It has a private coasting station and a large capacity steam plant. It owns a private aqueduct, three laboratories and an extensive network of pipelines and pumping stations. It runs a private fire brigade and a police force. During the war it built its own ships.

While illustrating and recounting the industrial development of the company, the brochure keeps an unusually high sense of family tradition and religious feeling. Deep respect is paid to the founder of the company and to his moral and spiritual values which keep their influence to this day.

The family feeling too, is preserved and interspersed with the photographs showing the shipyards, plant and laboratories are many more portraits of the founder, his descendants, and the present staff.

Meal and Pectin from Citrus Waste

By W. Williams

INCREASING attention is being paid by citrus fruit processers in both South Africa and Southern Rhodesia to the recovery and utilisation of the waste materials left during processes such as orange juice extraction and concentration, essential oil manufacture, fruit and marmalade canning etc. These wastes include solid matter such as peel, pulp and seeds, also liquid effluents such as press liquors.

One of the most important developments recently has been the marketing of citrus meal for cattle feeding. At least two citrus factories, those of the British South Africa Company at Mazoe in Southern Rhodesia and W. J. Bush at the Isando Industrial Township, Kempton Park near Johannesburg, have installed special plant for the manufacture of dry meal.

Citrus meal has been well known in the U.S.A. for many years as a feed for dairy cattle and although its appearance in Southern Africa is so recent, this meal is rapidly gaining in popularity there also. Cattle-feed manufacturers are able to use the new citrus meal as a partial replacement of maize meal in balanced rations. The present Rhodesian output of some 800-1,000 tons annually has been successfully disposed of in this manner, apart from small quantities used directly as fodder on the citrus estates supplemented with bean hay for additional protein.

Production of citrus meal

Manufacture of citrus meal from factory wastes consists of mechanical disintegration of the peel and pulp, chemical treatment to break down the sticky character of the wet pulp and liberate moisture, pressing to remove excess liquor and finally drying and bagging. The Mazoe plant can handle up to five tons of wet citrus waste per hr. with a moisture content around 80-85%. Treatment with hydrated lime at the rate of 8-12 lb. per ton of pulp liberates moisture and the resulting mass is continuously pressed to yield a non-sticky press-cake with about 70-75% residual moisture content together with a press liquor which contains 7-9% of soluble sugars. This press liquor is produced at the rate of 800-1,000 lb. per ton of original pulp and is another potentially valuable by-product as it can be used for the production of citrus molasses, food yeasts, alcohol etc.

Drying of press cake

The press-cake is then dried in a three-stage Shaw air-lift drier supplied from California. This is coal-fired and produces a final meal with a moisture content of 8-10%.

The total processing time from initial storage bins to sacking of product is only about 35 min., most of which is occupied by the pre-conditioning of the pulp. The short time for which the meal is dried and the low exit temperature of about 140°F. help to preserve the nutrient value and light colour of the product.

The South African plant, which is installed at the new Bush factory for essential oil and juice concentrates, uses a different drying system incorporating a conventional rotary drier constructed by local engineers, otherwise the basic processes used are similar in producing the dry citrus meal.

Value of citrus meal

Reports from research workers in the United States confirm that citrus meal is of a special value in conditioning dairy cattle and aiding milk production. The meal has proved palatable, digestible, possesses useful laxative properties and has an energy content which compares favourably with that of shelled maize. Chemical analysis of typical dried orange meal made at Mazoe shows the following constituents—

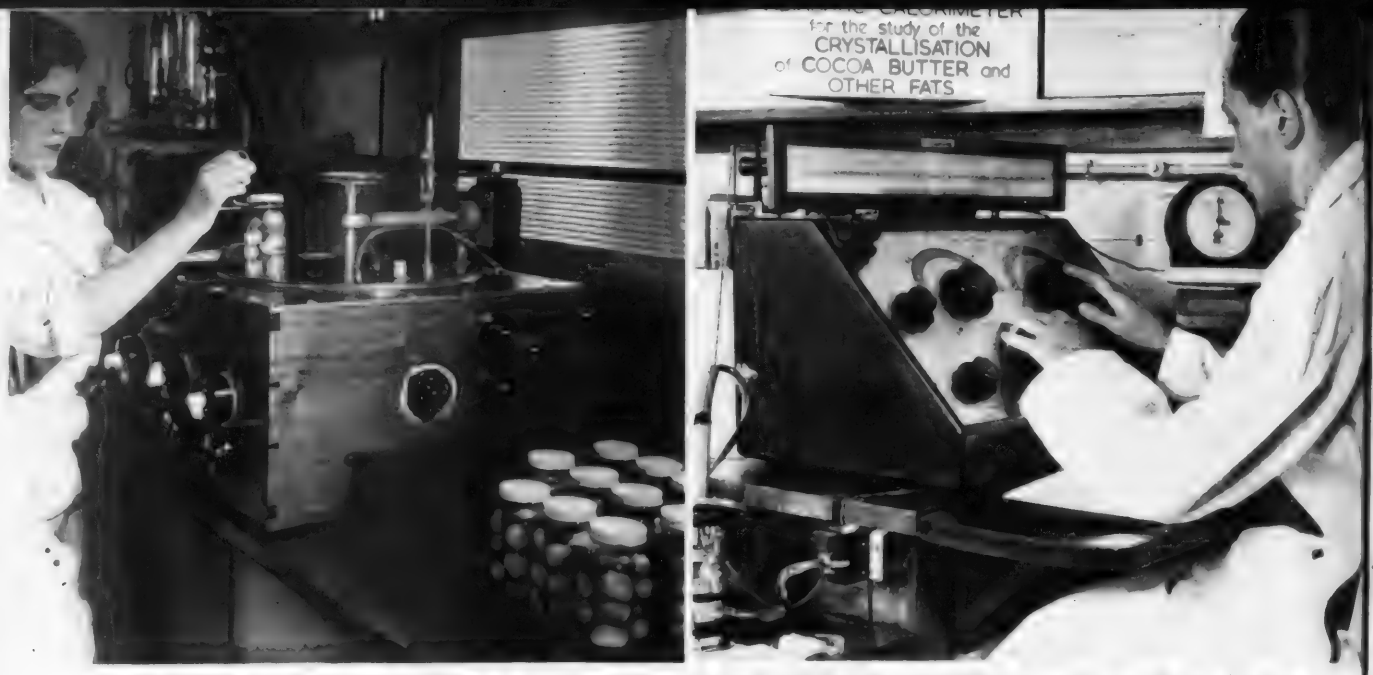
	%
Moisture content	9·4
Ash	6·9
Protein	5·3
Fat	2·0
Fibre	12·9
Carbohydrates	63·5

A high proportion of the carbohydrates is made up of sugars and total digestible nutrients are usually about 80%, the chief deficiency being protein. To combat this lack of protein, citrus meal is usually fed as about 25% or more of the ration along with high protein foods such as bean meal, lucerne meal etc.

The present trend towards complete recovery of citrus by-products from factory waste is being keenly watched by other South African citrus processing concerns and as the citrus industry is rapidly expanding, it is probable that further plant for the production of meal, molasses and other by-products will be installed shortly.

Citrus pectin

Another possible development is the local manufacture of citrus pectin, large quantities of which are at present imported into the Union for use in the manufacture of jam. Scientists of the Western Province Fruit Research Station have conducted tests into the manufacture of pectin from South African orange peel and figures show that from one ton of oranges about 210 lb. of dry peel could be obtained which in turn would yield 30-40 lb. of pectin powder with a gel strength of 175°. The present consumption of fruit pectin in all forms in the Union alone exceeds 50,000 lb. annually according to a recent survey so that there is definite scope for this branch of citrus by-product recovery. The manufacture of citric acid and citrates and extracts such as naringin (from grapefruit waste) and limonene are also potential by-product industries.



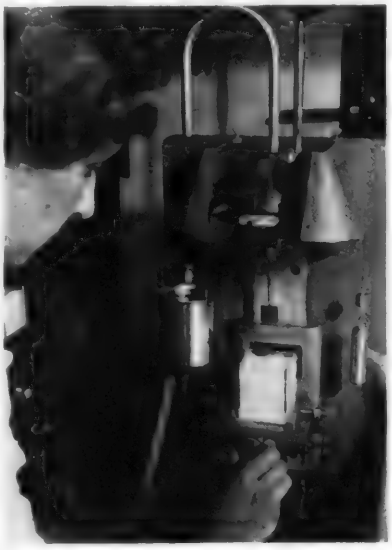
Left: **Pickled onions being removed from a pasteuriser designed by and built for the Association to study the effects of various heat treatments on pickles.** *Right:* **Making final adjustments to an adiabatic calorimeter used to determine the relative amounts of solid and liquid phases present in cocoa butter and other fats over a wide temperature range.**

Food Research at Leatherhead

The work of the British Food Manufacturing Industries Research Association, which was established in 1947 by the amalgamation of two older research organisations, falls into two broad categories: fundamental investigations of the nature of changes undergone by foods during manufacture, and research into specific problems arising from manufacturing processes. The Association now has about 500 members who are food manufacturers located in different parts of the country. On June 21 these members had an opportunity of seeing the Association at work in its laboratories at Leatherhead, Surrey, which were opened in 1950. Here is a brief description of what they saw.

RESEARCH is being carried out on a number of raw materials. In the jam laboratory new soft fruit varieties were being examined for their suitability for commercial jam manufacture, and a preliminary investigation of the factors involved in "blindness" of raspberry seeds was being conducted. In the same room the quality of raw materials and finished products is controlled by the determination of extraneous matter in foods and by the examination of fruit, tomato products, jams, etc. for mould filaments.

Crystallisation studies on cocoa butter and other fats by the adiabatic calorimeter were seen in another room. Crystallisation is studied through the determinations of specific heats and heat contents over a wide temperature range from which the percentage of liquid phase at a given temperature may be calculated. Other applications of this apparatus include the determination of melting points and of the state of cocoa butter in chocolate. Work was also being done on the viscosity of chocolate and on particle size measurement of icing sugar, cocoa powder, starch and defatted chocolate. A dew-point method for ascertaining the relative vapour-pressure of confectionery was being demonstrated.



The new F.I.R.A. jelly tester. Jelly is being placed in position on the instrument to take a measurement of its strength.

Much of the work at the laboratory is devoted to the study and control of the physical and chemical changes in foods during manufacture. In one room the new F.I.R.A. jelly tester was being used for the characterisation of the texture of jellies, while in

Left: **Chromatographic apparatus for determination of vitamin A in margarine by the method prescribed by the Ministry of Food.** *Right:* **Studying the working properties of chocolate. A rotational viscometer is inserted into chocolate melted at a constant temperature and the viscosity is calculated from the readings taken.**

another a comparison was being made between the new jelly tester and the older B.R.A. tester.

The stability of marzipan and other foods towards fermentation was being determined. Apparatus for appraising the spreadability and plasticity of margarines and cooking fats was demonstrated.

In other rooms visitors saw the Corn Industries viscometer being used to study the effect of additional ingredients on the pasting of starch. Other work on starch products included an investigation on the boiling-out of baking curds and its prevention, and a study of the variations in the moisture content of corn starch with changes in atmospheric humidity. Cloudiness in jelly marmalade due to the presence of crystals of hesperidin was shown.

In the microbiological laboratories a demonstration was given of methods used for the identification and study of micro-organisms. Examples of manufactured goods spoiled by microbiological attack and of pure cultures of the organisms responsible were shown.

In the technical laboratories studies were being made on canned goods, open meat packs, meat extract and confectionery. This included a demonstration of the use of thermocouples and an indicating pyrometer for measuring the temperature inside cans during processing and a display of devices for indicating whether or not trays or crates of cans or individual cans have been retorted. A wind tunnel for hastening the cooling of large meat packs and a distillation apparatus for the rapid concentration of meat extracts were shown. Confectionery drying stoves in which temperature and humidity are measured by means of wet and dry thermocouples, air movement past the wet thermocouple being ensured by the use of a suction pump, were also shown.

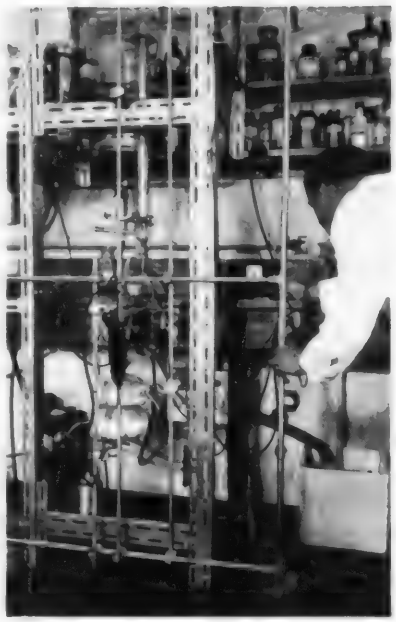
Chromatographic apparatus for determining vitamin A in margarine and liver oils was displayed in the analytical department. The variety of work carried out by this department was indicated by the assays taking place on the determination of fat in milk chocolate and other confections, fat analysis, the determination of lecithin, ascertaining traces of metallic impurities, and the determination of preservatives. These latter included sulphur dioxide, benzoic acid and a field test for sulphur dioxide in fruit pulps, etc. A continuous fat extractor for ascertaining the quantity of fat in plain chocolate, sausages, meat and bone meal was shown.

In another room work was in progress on the maintenance of purity and the prevention of damage by contamination. This includes studies on the corrosion of

metal containers and, in this respect, some contributory factors such as shielding effects, contact between dissimilar metals and temperature differentials (*e.g.* in pipelines) were indicated. The permeability of rubber sealing rings to gases and volatile substances was being investigated, and a salinity tester and an apparatus for the extraction and analyses of gases from the headspace in cans were shown. The salinity tester is used for studies on cured meats.

Visitors were shown round the photographic department, where photocopying apparatus and photomicrographic apparatus were shown, and the library and information department, where the Association's work in answering members' enquiries and the preparation of publications was seen. The B.F.M.I.R.A. report that from 1947 to 1954 they issued 61 research reports, 26 scientific and technical surveys, 72 technical circulars and 16 issues of their journal to its members. Abstracts from current scientific and technical literature, formerly prepared three or four times a year, have been produced monthly since 1953. The library is also equipped with photocopying apparatus.

The President of the Association is Sir Frank Engledow (Professor of Agriculture, Cambridge University), and the Vice-Presidents are Mr. J. G. Mathieson (Clarke, Nickolls and Coombs, Ltd.), and Lt.-Col. G. R. Harding (Aplin and Barrett, Ltd.). The Chairman is Mr. E. E. Wells (Rowntree and Co., Ltd.), and the Vice-Chairman is Mr. R. P. Woollard (London Oil Corporation, Ltd.). The Director of Research is Dr. F. H. Banfield, and the Secretary Mr. L. A. Harvey.



Molecular still for separation of vitamin A from liver oils.

A Problem in Probability

TESTING the acceptability of foods has developed into a skilled technique. Papers on the various techniques have been read and published in their hundreds over the last 15 years, which makes it all the more surprising that only one book* appears to have been written on the subject. This is a compilation of the proceedings of a symposium on food acceptance testing methodology held in Chicago in 1953.

Food testing, according to Dean Foster, the chairman of the conference, is a problem in probability. Essentially, however, it is a scientific problem and the conference hoped to define, or at least to suggest, a separate scientific discipline for acceptance measuring.

Four sessions are covered. The first four papers discussed the problem in more or less general terms but included, besides an analysis of flavour and a consideration of the variables affecting difference tests, a paper on the dilution method for determining the relative flavour stability of egg solids. The second session included a paper by L. C. Cartwright, co-author of the article "Problems of Packaging Odour and Flavour and their Solution" in our July issue. Military and civil problems of food preference were dealt with in the last two sessions.

* *Food Acceptance Testing Methodology*. Available free from the Quartermaster Food and Container Institute, 1819, West Pershing Road, Chicago 9, Ill., U.S.A.

Glucose Syrup Production

The conversion and evaporation steps in the production of glucose have remained basically unaltered for several years, according to Dr. W. Honsch (*Food Technology in Australia*, 1954 (10)), and it is only in the decolorisation and purification of the glucose liquor that any important development has taken place.

Originally finely ground bone char was used for this purpose. The purification of glucose solutions requires the removal of colour together with the excess acidity and ash constituents and bone char acts as a decoloriser as well as a de-ioniser. However, very large quantities are necessary and the need to revivify the charcoal involves a plant not much smaller than the glucose plant itself. Activated carbon has been used and needs much simpler plant. It is independent of production from the capacity of bone charcoal filters and the revivifying stage can be discarded. However, it is only a decoloriser and has no purifying qualities.

Superior quality glucose could be economically produced by using activated carbon and a chemical purification method which reduced excess acidity by removing weak acids. Three times more glucose could be produced by this method, while reducing manufacturing costs by 25%.

By combining cation and anion exchange resins in such a way that a very small acidity remained, a wet gel was produced with a very strong decolorising capacity. Experiments with such a resin showed it to be superior in decolorisation power and purification power to activated carbon and to improve the manufacture of solid glucose. Its manner of application is similar to bone char, but the regeneration procedure is simpler as the resin remains in the filter and is only washed with caustic soda solution, water and acid, and, of course, needs no "charring."

The combination of decolorisation with purification once more limits production capacity to the capacity of the resin plant.

Food Technologists' Meeting

Papers on many facets of food research and processing were read at the 15th annual meeting of the Institute of Food Technologists at Columbus, Ohio, recently. The subjects covered included meat, poultry, fruit, vegetables, food additives, flavours, nutrition, microbiology, fermentation, quality control, food engineering, canning, packaging, radiation, frozen foods and sensory testing. Abstracts of a selection of the papers are given below.

Meat

TENDERNESS OF BEEF. VARYING STORAGE TIMES AND CONDITIONS. *P. C. Paul and L. J. Bratzler.* (*Michigan State College*)

The effect of various cold storage, freezing and thawing treatments on cooking time, cooking losses, and shear tenderness of steaks fried in deep fat was studied. Tenderness increased according to the length of cold storage of the steaks. Handling the muscle before or during storage interfered with the tenderising process.

Additional cold storage or freezing of the steaks after 3 days' ageing on the carcase increased the tenderness. Cold storage was found nearly effective as freezing and thawing in increasing the tenderness. Usually the anterior portions of the steak were more tender than the posterior.

COMPATIBILITY OF SODIUM ASCORBATE AND SODIUM NITRATE IN MEAT CURING MIXTURES. *C. M. Hollenbock and R. Monohan.* (*Merck and Co.*)

Using the indophenol procedure for determining ascorbic acid and sodium ascorbate and a modification of the A.O.A.C. method for determining nitrite, sodium ascorbate and sodium nitrite were found quite compatible in wet curing mixtures at *p*H 6-7·5 with high salt concentration and at the usual refrigerated temperatures. They are compatible in dry curing mixtures at *p*H below 6 providing the mixtures are kept dry.

CONTINUOUS PROCESS FOR SMOKED MEATS. *J. W. Hanley, G. L. Montgomery, M. S. Rarick, M. C. Brockmann.* (*Kingan Inc.*)

Infra-red heating and the electrostatic deposition of smoke are combined in the continuous production of smoked meats by the process described. Smoke deposition is controlled by the voltage imposed on the ionising equipment, conveyor speed and the density of smoke entering the smoking section, where products are retained for 2-4 min. Heating is controlled by the power input to each infra-red oven and conveyor speed. In all important characteristics bacon processed in the continuous system is indistinguishable from conventionally smoked products while labour costs are reduced by 50%.

PREPARATION OF DEHYDRATED PORK OF REDUCED GLUCOSE CONTENT. *R. L. Henrickson, D. E. Brady, C. W. Gehrke and R. F. Brooks.* (*Missouri Agricultural Experiment Station*)

Experiments with yeast cells and glucose-oxidase enzyme showed that the storage life of dehydrated pork was extended by reducing the glucose content. The meat was improved by fermenting with 5-10% yeast at an optimum reaction period of 4-8 hr. at 40°F. The shelf life of dehydrated pork was improved when it was cooked before fermentation.

Four parts of the enzyme and 5 parts of hydrogen peroxide were used to each 1,000 parts of meat at a reaction time of 4 hr. at 50°C. Nearly 25% more glucose was converted to gluconic acid when glucose oxidase was reacted with cooked meat than with uncooked. The taste panel found the enzyme-treated meat superior to the untreated.

CHEMISTRY OF CURED MEAT PIGMENT FADING. *H. N. Draudt and F. E. Deatherage.* (*Ohio State University*)

Purified, heat-denatured nitric oxide myohæmochromogen was used to study the fading reaction in cured meats. The experiments were carried out with simple chemical systems and Warburg manometric equipment adapted to photochemical studies. The pigment rapidly lost nitric oxide in the presence of oxygen and light and continued to do so at a low but measurable rate in the dark when oxygen was present. This nitric oxide appeared as the nitrate and nitrite ions. In the simple systems used, denatured globin myohæmochrome appeared as an intermediate after loss of the nitric oxide, and underwent further oxidation of the protein with darkening in the presence of light and oxygen.

DE-HULLED EXTRACTED SOYA BEAN FLAKES AS A GROUND MEAT EXTENDER. *R. Pippitt, A. I. Nelson and M. P. Steinberg.* (*University of Illinois*)

Experiments to find a treatment for reducing the undesirable flavour of de-fatted soya bean flakes showed the most practical method was to treat wetted flakes in live steam for a short period. The resulting flakes were mixed with ground beef, grilled and presented to a taste panel. All members preferred the meat containing treated soya bean flakes. The optimum content of flakes was found to be 25% of the mixture.

Poultry

EFFECT OF FLUCTUATING TEMPERATURES ON FROZEN TURKEYS. *A. A. Klose, M. F. Pool and H. Lineweaver.* (*U.S. Dept. of Agriculture*)

Quality deterioration in turkeys was studied over a period of 18 months as a function of packaging, scalding temperature and experimental temperature conditions. Moisture loss from permeable packages increased with the

rise in temperature. The loss due to fluctuating temperatures corresponded to the loss estimated for storage at a constant temperature of 3°F. Frost formation in relatively impermeable packages increased with the temperature. Turkeys scalded at 140°F. developed nearly twice as much frost as those scalded at 126°F. Flavour deterioration also increased with a rise in storage temperature.

FACTORS AFFECTING THE RATE OF CHICKEN MEAT DEHYDRATION UNDER VACUUM. *A. Yao, A. I. Nelson and M. P. Steinberg.* (*University of Illinois*)

Chicken muscles were dehydrated in a vacuum plate drier and the final product quality evaluated by means of rehydration ratios and organoleptic tests. Freeze drying was also used for comparison. Vacuum dehydration required one-fourth the drying time without apparent impairment of product quality.

Fruit

DEHYDROFROZEN APRICOTS. *M. J. Powers, W. F. Talburt, D. H. Taylor and L. H. Walker.* (*U.S. Dept. of Agriculture*)

Dehydrofrozen apricots were produced by controlled sulphur dioxide treatment before dehydration. Modifications in cooking procedures and the quality of pies and preserves made from these products were discussed and compared to those made from conventionally frozen apricots. Many observers were unable to detect sulphur dioxide in the final product.

EFFECT OF TIME-TEMPERATURE HISTORY ON COLOUR DISTRIBUTION IN CONSUMER-SIZE, COMMERCIALLY PACKED, FROZEN RASPBERRIES. *D. G. Guadagni and C. C. Nimmo.* (*U.S. Dept. of Agriculture*)

Temperatures of 10°F. and above for one year caused a marked colour transfer from berries to syrup. The changes were quantitatively expressed as a fruit: syrup colour ratio.

CANDIED FRUIT METALLIC DISCOLORATION. *J. A. Kitson and C. C. Strachan.* (*Canada Dept. of Agriculture*)

Artificially coloured candied fruits are discoloured by metallic ions of copper, aluminium, iron and tin. These ions are absorbed by fruit tissue from the syrup and the metal ion concentration of the syrup is reduced. Metallic discoloration of candied cherries is a result of two independent reactions. The first is a reaction of the ions with natural fruit pigments and the second appears to be a stoichiometric reaction between the ions and artificial food dyes. Addition of 0·2% calcium phytate reduces discoloration by copper concentrations up to 50 p.p.m., while 0·025% eliminates undesirable reactions of 100 p.p.m. aluminium. Disodium ethylenediamine tetracetate was ineffective in preventing discoloration by copper or aluminium.

EFFECT OF TIME-TEMPERATURE HISTORY ON THE ASCORBIC ACID CONTENT OF CONSUMER-SIZE, COMMERCIALLY PACKED, FROZEN STRAWBERRIES. *D. G. Guadagni and C. C. Nimmo.* (*U.S. Dept. of Agriculture*)

The variation in the original amount of reduced ascorbic acid in several samples of commercially frozen strawberries was studied. Fairly rapid losses in ascorbic acid occurred at 10°F. and above, but retention of the acid during storage at these temperatures was affected by the type of packaging material.

Microbiology

STUDIES ON THE SENSITIVITY OF FOOD SPOILAGE MICRO-ORGANISMS TO VARIOUS ANTIBIOTICS. *F. S. Gibson, A. R. Kohler and L. R. Hines.* (*American Cyanamid Co.*)

Spoilage organisms from 20 protein foods were tested against a variety of antibiotics. The foods were allowed to spoil under refrigeration for 1-3 weeks. Suspensions of the organisms were lyophilised and plated into nutrient agar containing different concentrations of the antibiotics. Following incubations the viable bacteria were counted and the sensitivity of the antibiotics determined. The results showed that chlortetracycline was more effective than any of the other antibiotics studied.

Radiation

NUTRITIONAL AND BIOCHEMICAL EFFECTS OF RADIATION. *C. G. King* (*Nutrition Foundation, Inc.*) *and R. R. Becker.* (*Columbia University*)

Long-term feeding studies in which the butterfat portion of the experimental diet has been irradiated are being made with special reference to the presence of carcinogenic compounds. A vitamin E deficiency has been observed in other laboratories when irradiated meat was part of the diet. A slight decrease in reproduction, partially remedied by vitamin E supplements, has been found. A slight growth decrease has been noted in some experiments, even when vitamin E was furnished. No evidence of specific abnormalities was observed upon examining the tissues of experimental animals.

Related studies on the destruction of some of the nutrients in milk and other dairy products showed vitamin A, the tocopherols and ascorbic acid to be highly sensitive to destruction at sterilisation doses; the carotenes and riboflavin were moderately sensitive. Studies of the radiation-induced oxidation of ascorbic acid indicate a reaction mechanism that does not involve chain utilisation of oxygen.

CONCOMITANT USE OF RADIATION WITH OTHER PROCESSING METHODS. *H. W. Schultz, R. F. Cain and H. C. Nordan* (*Oregon State College*), *and B. H. Morgan.* (*Q.M. Food and Container Institute for the Armed Forces*)

In all tests with hamburger, frankfurters and bologna, the flavour score of non-irradiated samples was significantly higher than any of the irradiated samples. Results so far show that the flavour developed by irradiation in fresh, unfrozen hamburger,

canned without exclusion of air, is statistically no different in intensity than when the hamburger is irradiated while frozen or canned in vacuum or in nitrogen or after cooking. There was no significant difference among any of the conventional processing procedures which were coupled with irradiation. The intensity of the gamma flux and the time required to achieve 2×10^6 rep seem to have no influence on the intensity of the irradiated flavour.

Evaluation of unseasoned ground pork showed that tasters familiar with irradiated flavour could not distinguish between irradiated and non-irradiated samples. Of the 30 processing variables tested, only partial and complete cooking before irradiation had any effect. Such pre-treatment significantly lowered the flavour score.

EFFECTS OF IONISING RADIATIONS ON THE PROTEIN COMPONENT OF FOODS. *F. J. McArdle and N. W. Desrosier.* (*Purdue University*)

Solutions of purified proteins were irradiated in a high-energy cathode beam produced by an 8 M.E.V. linear accelerator. The physical and chemical changes occurring in these proteins were studied by means of enzyme reaction rates, viscosity and electrophoresis mobility. The effectiveness of ascorbic acid in protecting proteins from the action of ionising radiations were discussed and the findings related to the cold sterilisation of milk, eggs, meat and other foods.

EFFECT OF GAMMA RADIATION ON THE BAKING QUALITY OF SOME WHEAT FLOURS. *L. E. Brownell and H. A. Harlin.* (*University of Michigan*)

Bread, cake and all-purpose flours were given doses of gamma radiation and made into bread, biscuits and cakes. Taste panel tests were made.

Loaves made with 20,000 rep flour were equal to those made from non-irradiated flour except for a slightly smaller total volume. Flour given a dose higher than 50,000 rep was considered to be undesirably altered. The quality of cakes made with irradiated bread flour decreased with increasing doses of gamma radiation.

When making biscuits from flour receiving 20,000 to 150,000 rep it was necessary to add more fluid to obtain a workable dough. This dryness of irradiated flour was noticed when mixing cakes. Biscuits made from irradiated flour had a satisfactory appearance, but the eating qualities and flavours were not equal to those of the controls.

Cake flour, all-purpose flour and bread flour were unchanged when dosed with 20,000 rep gamma radiation. Cakes made with these flours were similar to the controls in all respects. At 20,000 rep flour insects and weevils are destroyed and eggs made sterile.

Packaging

CHROMATE TREATMENT FOR PRESERVING EXTERIOR BRIGHTNESS OF PROCESSED FOOD CONTAINERS. *M. Siegel* (*Consultant*), *and J. W. McGrew and C. C. Bertucio.* (*Mutual Chemical Co.*)

Sodium chromate added to either retort processing water or cooling canal water materially helps to preserve tin brightness and to lengthen rust-free shelf life of tinned food containers. A simple dip treatment is also effective. Sodium chromate minimises the de-tinning tendency of alkaline waters and has not been detected inside the cans.

Vegetables

PRE-PEELING OF POTATOES. *R. L. Olson, P. C. Mayer, W. O. Harrington, W. R. Mullins and A. L. Potter.* (*U.S. Dept. of Agriculture*)

Low-temperature (below 160°F.) lye peeling is a feasible commercial operation which reduces peeling loss and trimming labour, compared with abrasion peeling, but there is less resistance to spoilage and occasionally areas of surface cooking occur. Pre-peeled potatoes must be cooled rapidly for the best protection against spoilage. Refrigeration of the treating solution is a practical method for cut potatoes but is not sufficiently rapid for whole ones. These are best cooled by circulated cold air in refrigeration rooms. Small potatoes and pieces may be processed to make hash-browned stock for restaurants.

A COMPARISON OF THE STABILITY OF CANNED CONCENTRATED TOMATO JUICE AND CANNED SINGLE-STRENGTH TOMATO JUICE. *A. C. Rauch and I. T. Nii.* (*Quartermaster Food and Container Institute*)

Over a period of 2 years, deterioration occurred more rapidly in a four-fold concentrate of orange juice than in a single-strength product. Internal container corrosion and the development of swelled cans also occurred more rapidly with the concentrated product. No swelled cans appeared with the single-strength juice.

STABILITY OF DEHYDRATED POTATO PRODUCTS. *C. E. Hendel and H. K. Burr.* (*Western Utilisation Research Branch, U.S. Dept. of Agriculture*)

Sulphite was applied to dehydrated potato dice by three commercial methods. A heavy spray with dilute sulphite solution gave the best protection against non-enzymatic browning. Reduction of moisture from 7-4% effectively retarded browning. In granules browning was retarded by moisture reduction from 7-4%, but relatively little protection resulted from increasing the sulphite content. Rancid odour and absorption of oxygen were reduced by treating granules with butylated hydroxyanisole, but the protection against rancidity in the reconstituted products was less than in the dry granules. The results suggest, however, that antioxidants could be used in potato granule manufacture to help control rancidity.

Miscellaneous Processes

STABILISED LEMONADE POWDER. *G. K. Notter, D. H. Taylor, E. C. Marshall and L. H. Waler.* (*Western Utilisation Research Branch, U.S. Dept. of Agriculture*)

Lemonade powder is made by dehydrating a mixture of lemon juice concentrate, sucrose and lemon juice sacs in a vacuum shelf drier to a moisture level of about 2%. The product is vacuum packed in a low humidity atmosphere with lemon oil locked in a solid carrier and an in-package desiccant. The reconstituted product compares favourably with lemonade from fresh lemons.

PECTIC ENZYMES IN WINE MAKING. *W. V. Cruess and R. Quacchia.* (*University of California*)

Since hydrolysis of pectin liberates some methyl alcohol the effect of pectic enzymes on the methanol content of wines was studied. The amounts found in the enzyme-treated wines were very small, ranging from 0·004 to 0·026 g. per 100 c.c., far below the legal limit. Treated wines become clear sooner and the sediment is more compact and smaller than in untreated wines. Treated wines age more rapidly and may be bottled earlier. Usually they possess more aroma.

THE PEEBLES INSTANT MILK PROCESS. *D. D. Peebles.* (*Western Condensing Co.*)

Quickly soluble, free-flowing, non-foaming, non-fat dry milk with the flavour of fresh milk is used in this process. Raw materials are conventional low heat, spray-dried, extra grade, non-fat, dry milk solids. Batches of this powder are blended and delivered through a metering device to an air conveyor which discharges into the processing chamber.

In this chamber the moisture is adjusted under controlled conditions and a fluffy sponge-like material is produced. This is delivered to a belt conveyor which, after a suitable period, discharges into shaker driers where the moisture content is reduced to 3-3·5%.

During the later stages the product takes on granular characteristics and enough milk sugar is converted to the monohydrate to make the product non-hygroscopic. The dry product goes through sizzling rolls to drums where the final product is stored before packaging.

The ABC of Vitamins

THE SECOND* of the volumes comprising this work is the longest of the three and follows the same general pattern as volume I (see FOOD MANUFACTURE, December 1954, p. 489). As in volume I the vitamins are reviewed in alphabetical order and volume II includes chapters on choline, the vitamin D group, the essential fatty acids, the inositols, the vitamin K group, niacin and pantothenic acid. Those engaged in the food industry may find this volume somewhat less interesting than either volumes I or III, both of which deal in the main with vitamins of practical importance in human nutrition. From this point of view, the chapters on vitamin D and niacin are perhaps of the greatest interest, but most of the other chapters are nevertheless of considerable importance in providing authentic information about the chemical and biological behaviour of other and less familiar members of the vitamin family, and especially of their relationships with one another and with those of more practical importance.

As before, each chapter is divided into sections covering the chemistry, industrial preparation, estimation, occurrence, effects of deficiency and so on of the vitamins under consideration, and each section is written by a specialist who more often than not has himself made a major contribution to knowledge in the particular field. Although this makes the text more authoritative than would otherwise be the case and perhaps enhances the value of the book for purposes of reference, there is almost inevitably some overlap between the sections written by different authors and there is also considerable variation in the style of presentation, some sections being considerably easier to read than others. In one or two parts of the present volume the authors do not appear to have sufficiently digested the original literature, but have been content to string together summaries of the original publications with only the slenderest of connecting links. Again, some authors have gone into great detail where others have been content to generalise and merely indicate by references where more detailed information can be obtained. In spite of these shortcomings there is no doubt that this volume, like its predecessor, will prove to be an invaluable work of reference for many years to come.

The chapter on vitamin D which comprises about one-sixth of the book relates to some of the earliest work in the vitamin field, and is a useful recapitulation of results which are now largely of historical interest, and to which comparatively little has been added in recent years. Dr. C. E. Bills, who was associated with the original work on the irradiation of ergosterol, deals very fully and clearly with the sterols most closely related to calciferol and vitamin D_3, and discusses the nature of other members of the vitamin D group. He points out what is not generally appreciated, that vitamin D_3 is probably not the dominant vitamin D of cod liver oil and that this is "something different from any recognised form." This section also includes a useful table showing the vitamin D contents of different fish oils, while the next section comprises an all too brief account of the industrial preparation of vitamin D ignoring altogether the methods used to isolate the crystalline vitamins from the irradiation products. The effects of vitamin D deficiencies in animals and man are very fully discussed by other authors in another section which is illustrated by excellent photographs.

The chapter on niacin is perhaps the most important in the present volume, at all events for scientists engaged in the food industry. Only slightly longer than the vitamin D chapter, it gives de-

**The Vitamins: Chemistry, Physiology, Pathology*; Vol. II. Edited by W. H. Sebrell, Jr., and R. S. Harris. Pp. xiv + 766 New York: Academic Press. London: Academic Books Ltd. 1954. $ 16.50; £6. 12s. net.

tailed information on the chemical properties of nicotinic acid and its amide and on methods of synthesis; but why, one may ask, are the patent references given in this section and not in that relating to industrial preparation? In the section on the biochemistry of nicotinic acid, the two coenzymes that contain nicotinic acid are described, together with the very varied biochemical reactions in which these are involved. The complex problems of assaying nicotinic acid in foodstuffs and of estimating its numerous excretion products are competently dealt with, while a lucid account is given in two other sections of the by no means simple relationship between nicotinic acid and tryptophan, and Dr. J. M. Hundley, who has written most of the niacin chapter, advances a reasonable hypothesis to account for the differences in tryptophan metabolism that occur in different circumstances. Some interesting information is also given about the enrichment of white flour with nicotinic acid as carried out in the United States.

In contrast to the chapter on vitamin D, that on pantothenic acid contains a great deal of recent information, particularly about coenzyme A which catalyses a large number of important enzymatic reactions and of which pantothenic acid is known to be an essential component, a recent discovery that fully explains the importance of pantothenic acid in human and animal nutrition, even though by virtue of its widespread occurrence in foodstuffs a frank pantothenic acid deficiency in man is most unlikely ever to be encountered. This chapter should be of considerable value to those who want to evaluate the importance of pantothenic acid in the light of recent developments. The problem of assaying pantothenic acid is competently dealt with in the section on "estimation," whilst that on "occurrence" includes lengthy tables showing the pantothenic acid contents of different foodstuffs and biological materials.

The biochemical behaviour of choline has attracted a great deal of attention recently, and although no case of choline deficiency has ever been reported in man (unless kwashiorkor and infantile cirrhosis can be so regarded), recent researches into the mechanism of methylation indicate the key position occupied by choline in maintaining certain vital metabolic processes in the liver. The importance of choline is reflected in the space devoted to it in this volume, for rather surprisingly this chapter is the same length as that on vitamin D. The close connection between choline and other members of the vitamin B complex and even ascorbic acid and vitaman A is brought out very clearly in this chapter, especially in the long and comprehensive section on the effects of choline deficiency. The relatively short chapter on inositol describes another lipotropic factor, the biological properties of which are still shrouded in mystery. One can only agree with one of the authors, however, that "the wide distribution of inositol in the body and the data accumulated in investigations in animals make it reasonable to predict that increased knowledge probably will demonstrate an important rôle of inositol in the human organism."

So far as the rest of the book is concerned, some readers, although prepared to accept choline and inositol as vitamins, may have difficulty in accepting as such a group of unsaturated fatty acids or even, in spite of its name, vitamin K, for both are nowadays almost completely disregarded as factors of nutritional importance. However, historically both have a strong claim to recognition as vitamins, and therefore to inclusion in a book such as the one under review even though to a majority of readers these chapters may be of less interest and value than the others. A more serious criticism, already previously hinted at, is the meagreness of the space devoted to the sections on "industrial preparation," which are in most instances very sketchy, as indeed they were in the first volume. Several of the vitamins discussed in the present volume have an extensive patent literature from which a great deal of useful information could have been gleaned. There is in fact a surprising neglect of patents throughout this particular volume even in the sections on "chemistry," and if this defect could be remedied in future editions it would considerably enhance the value of the book to those concerned with the industrial aspects of vitamins.

This volume, like its predecessor, is equipped with an excellent author and subject index which makes it possible to use each volume independently of the others. It is well printed and bound, and appears to contain very few misprints.

F. A. Robinson.

Eggs and Egg Products

A new D.S.I.R. report* is intended to provide information to food manufacturers and those concerned with the preservation of eggs. It is the result of collaboration between the British Food Manufacturing Industries Research Association and the Food Investigation Organisation.

The preservation of eggs, either in the form of intact eggs, frozen eggs or dried eggs, depends on the successful control of a number of physical, chemical and microbial agents. The aim of the report is to describe the principles underlying the different methods of preservation and to relate the properties of eggs to the uses to which they are put.

**Eggs and Egg Products*, special report No. 60 of the Food Investigation Organisation. H.M.S.O. 4s. net.

An interesting feature of a new Dodge and Olcott publication, "For the Canning Industry," is a definition of the term "canning." Declaring that the term today extends far beyond the process of preserving food in cans, the booklet states: "the industry itself includes those who pack products in tins, glass, frozen food containers, and the dried fruit and vegetable industry." The booklet contains a brief but impressive survey of the extent of this industry. There are plants in 47 of the 48 United States, plus Alaska, Hawaii and Puerto Rico, and each year's production amounts to about 20,000 million lb. or about 6% of the nation's food supply. The main purpose of the booklet is to describe the flavours provided for the canner by Dodge and Olcott.

Danish Food Factories Studied by British Chemists

Denmark's efficient and versatile food industry was studied by members of the Food and Agriculture Groups of the Society of Chemical Industry during their recent summer tour. Among the places visited were the new Meat Research Institute at Roskilde, the famous Carlsberg brewery and the equally well-known factory where Cherry Heering is made. Cheese, bacon, bread and fruit and vegetable processing were among the other subjects studied during a crowded and busy week. Here is a description of the highlights of the tour.

THE main body of this year's summer tour left London punctually at 3.5 p.m. on Friday, June 3, in spite of the railway strike, and after a pleasant journey on the *Kongen Frederik* arrived at Esbjerg the following day, reaching Copenhagen at 7 p.m.

After being joined by the rest of the party, who had made their own way to Copenhagen, we had dinner and spent the evening at Lorry's, a popular Danish beer garden restaurant. The following day we went for a coach drive along the beautiful Danish riviera, and visited the Kronborg Castle at Elsinor, Fredensborg Palace, and Frederiksborg Castle, with a rest for lunch at the Slotspavillonen in Hillerod.

On Monday morning we visited the Plumrose A/S, a meat canning factory at Valby, who produce weekly 200 tons of canned meat products such as hams, cooked sausages, liver-paste, and meat loaf, mostly for export. They also can fruit and vegetables and milk and are considerable exporters of butter and cheese.

After lunch we visited Fabriken Milco, manufacturers of processed cheese, who showed us their very efficient modern plant, the cheese-wrapping machines arousing particular interest. Varieties of processed cheese that contain shrimps, or ham, or mushrooms, are becoming increasingly popular.

Next we paid a visit to Peter Jensen A/S, neighbours of Milco, who are an old established company of merchants and maturers and distributors of cheese. Here we learned a number of interesting facts about the organisation and operation of this kind of business.

At the end of this visit, Peter Jensen A/S and Milco jointly entertained us to an excellent tea at which ample opportunity was given, and taken, to taste the products we had seen during our visits to both establishments.

Meat research

The next day we made an early start in coaches for a visit to the Meat Research Institute at Roskilde. Here Mr. Mogens Jul, the director, welcomed us and with the help of his colleagues showed us round this well-designed, modern institute, which was built with funds supplied by the bacon curers and meat canners of Denmark.

The main object of the institute, Mr. Jul explained, was to act as an advisory, control, and research centre for all aspects of meat production, and to give courses of instruction to foremen engaged in the industry.

A particularly interesting feature of the building is the number of instruments in each laboratory which can be connected to a centrally situated apparatus which automatically records readings at required intervals.

While the ladies then went to visit an old convent which was now an elegant old ladies' home, and a modern school, the main party went to a co-operative slaughterhouse, the Roskilde Andels Svineslagteri, which also houses an egg packing station, being received there by the manager, Mr. Boglund. This establishment handles about 125,000 pigs per annum, mostly baconers, mainly for export, and a much smaller number of cows and calves, whose meat is consumed on the home market. Each stage of the production line was carefully explained to us by the local sales manager, Mr. Klem, who also showed us round the egg packing station where eggs are automatically sorted and weighed.

The ladies then rejoined us at the Lindenberg Kro, a thatched, picturesque old inn, where we enjoyed a magnificent Danish lunch (the terms are synonymous) as the guests of the Danish Bacon Export Board, whose representative, Mr. Behnke, presided at the table.

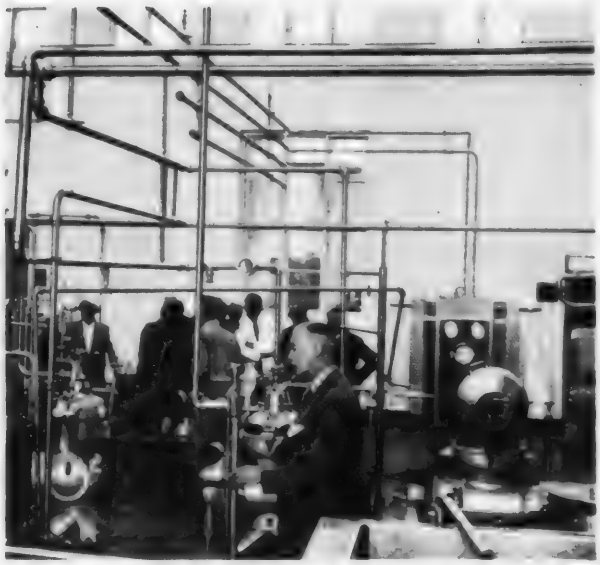
In the afternoon we went to the Government Pig Progeny Testing Station near Roskilde, and visited its modern piggery. Mr. J. C. Madsen received us and explained that piglets were sent to this establishment from a large number of farms in Zealand and were fed on a standard diet consisting of barley and skimmed milk. Careful records are kept of their increase in weight and change in conformation, these being later related to the various characteristics of the bacon.

After this visit we were offered refreshments by Mr. and Mrs. Lanksbjerk Hansen, a farmer and his wife, who very kindly showed us round their immaculate house and typical mixed Danish farm.

Back in Roskilde, the former capital of Denmark, we visited the somewhat grim but nonetheless fascinating cathedral which is the burial place of all the kings and queens of Denmark since the earliest days of the history of the country.

Bread and cherry brandy

Wednesday morning found us



Left: **This beautiful example of plant fabrication is a one-ton stainless steel butter churn at the Government experimental dairy, Hillerød.** *Right:* **More stainless steel dairy plant at Hillerød being examined and discussed by the British visitors.**

in the factory of Schulstad and Ludvigsens Brodfabriker A S, whose weekly production of rye-bread amounts to 24,000 lb. Our attention was attracted especially by an ingenious hydraulic mechanism for placing charges into the oven, removing the charges after baking, and conveying them to cooling racks. Seven types of rye-bread, 12 types of wheat breads, and loaves made from a mixture of rye and wheat are also made by them.

Whilst this visit was in progress the ladies were being shown the Royal Copenhagen Works where they saw the versatile and talented artists and craftsmen designing and painting this well-known and beautiful porcelain.

After lunch we went to Peter F. Heering where, under the expert guidance of Mr. Kiersing and his colleagues, we were shown the 20,000 bottles per day bottling plant and huge storage vats.

Mr. Kiersing told us that most of the cherries used to make cherry-Heering according to an old family recipe come from their own orchards, but that they had also had to buy considerable quantities from independent orchards. We were then allowed to taste some of this delectable liqueur, and each given a sample to take away, which was big enough to arouse the unwelcome attention of H.M. Customs' inspectors at Harwich.

Danish food production

In the evening we were received by the Danish Institute of Civil Engineers—civil engineering in Denmark meaning all science and technology not connected with military engineering—and after being welcomed by the vice-president, Mr. R. P. Frydenberg, we were given an address by Mr. Jul on "The Danish Food Industry—Past and Present." Among the points made by Mr. Jul in his interesting address, were that tuberculosis had been completely eliminated in Denmark, and that foot and mouth disease was now practically unknown; trichinosis of pigs had been eradicated.

In Denmark, Mr. Jul said, the yield of grain was 39 bushels per acre, as compared with 30 in the U.K., 22 in France, and 19 in the United States. The yield of grain in bushels per person was 240 in Denmark as compared with 166 in the U.K. The average size of the Danish farm, of which there were over 208,000, was only 33 acres, yet in spite of higher wages in Denmark, the production costs of eggs, bacon and butter were about two-thirds of those in England.

The annual turnover of pigs in Denmark was about 7 million, and these were fed largely with food produced in the country, barley and beet, for instance, and skimmed milk. Very large quantities of skimmed milk are available, for 70% of the total milk production is used to make butter. The success of Danish bacon rests entirely on the skilful development of the Danish Landrace pig, whose conformation and quality are the result of careful co-ordination of selective breeding. The "Lur" trade mark on all Danish food products is a guarantee of quality. The annual value of Danish food exports exceeds £200 million.

An excellent dinner followed, after which we adjourned to one of the lounges of the Institution where we met a number of the personalities in the Danish food industry.

State experimental dairy

The following morning we went for another very pleasant drive, this time through the friendly countryside of Sjaelland to the State Experimental Dairy on the outskirts of Hillerød. There, Mr. Møller-Madsen, the director, met us, and with the help of his colleagues showed us round this well-equipped establishment, which

carries out research work on all aspects of dairy science, and also tests dairy equipment and plant on behalf of manufacturers.

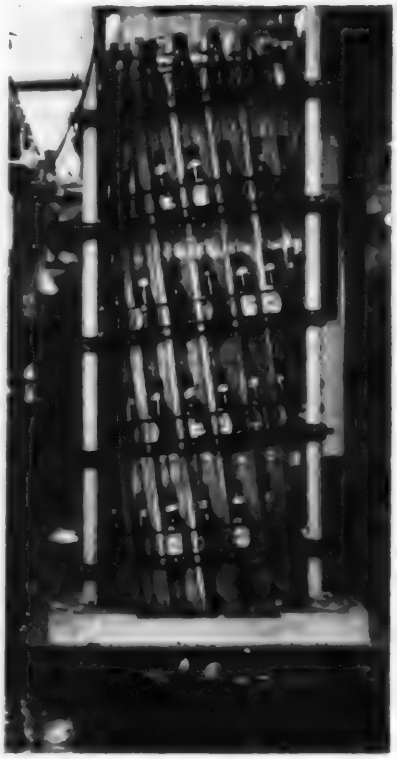
A delightful light lunch of butter, cheese, and milk, all made on the premises, and some biscuits, concluded this visit, after which we drove to the Favrholm section of the State Experimental Farm, the site of an old manor, which goes back to 1363, to the days of King Valdemaar Atterdag. Mr. Guy, our guide, after giving us the opportunity to admire the beautiful 19th century thatched buildings in which the farm staff live, showed us round the establishment, particularly the cow-shed which housed 100 Red Danish and 20 Jerseys, and explained the breeding and feeding experiments that are carried out with them, and with the pigs, sows, and their progeny, which we later saw in the newly constructed piggery.

On the way to the main building of the State Experimental Farm at Trollesminde we stopped to see a poultry testing station where diet experiments correlated with egg-laying were in progress, as well as a fur farm where rabbits of various breeds are being bred to determine the optimum conditions for meat and fur production.

On arrival at Trollesminde we were met by Mr. and Mrs. Lassen, the director and his wife, who welcomed us most graciously to their fine old manor house and entertained us to coffee and tea and delicious Danish pastries. Then, again under the guidance of Mr. Guy, we were taken through the model cow stables and also to a section of the farm devoted to the breeding of silver-foxes, minks and coypus.

Carlsberg brewery

On Friday morning we went to the Carlsberg Brewery, whose profits are used for the promotion of science and art. There we were met by Mr. Fogh, the technical director, and Mr. Anker Roepstoff. The Carlsberg laboratory was founded by J. C. Jacobsen, the son of the founder of the brewery, and we were most interested to have an opportunity to see the



Not a model of the leaning tower of Pisa but a novel bottle conveying machine at the Carlsberg brewery.

laboratories which are associated with such great names as J. C. Hansen, Sorensen, and Kjehldahl.

After an excellent Danish lunch the party again divided, this time into small sections each with different objectives, which included the "Laboratoriet for industriel udnyttelse af frugt og grøntsager," a laboratory devoted to research on preservation and canning of fruit and vegetables; the Dansk Gaerings Industri A/S, where interesting research is being carried out on yeast; the cereal and bakery laboratory of the Teknologisk Institut; and the chocolate manufacturers—Tom's Fabrikker A S.

In the early evening we gave a farewell cocktail party at the Palace Hotel, attended by over 100 people, which included many of our hosts of the week, and many distinguished scientists, technologists, and business men. This enabled us to renew acquaintances we had made and also meet old friends, and it was gratifying to the organisers to see how well the English hosts mixed with their Danish guests, a small demonstration of the value of these Food and Agriculture Group tours abroad.

Thanks are due to Mr. R. P. Frydenberg, and Mr. Ove Guldberg, the general secretary of the Danish Institute of Civil Engineers, for all the trouble they took and all the help they gave this year's honorary organising secretary, Dr. B. V. de G. Walden, in the planning of this tour of Denmark.

Control Chart Technique

A NEW British Standard* gives practical guidance on the use of Quality Control in all processes of manufacturing to a specification. Written by Dr. B. P. Dudding and Mr. W. J. Jennett, it was first published by the General Electric Co. in 1944, and with the kind permission of the director of the Research Laboratories of the G.E.C. it is now issued as a British Standard.

The same authors intend to supplement B.S. 600R, which is already well known for its description of the statistical principle and methods used in Quality Control.

The new Standard is essentially a practical manual describing procedures which have been found acceptable when introducing and operating Quality Control methods as factory routine. Its major object is to assist production to a standard of quality, with the elimination of waste of labour and material.

The standard is divided into two parts. The first concerns the utilisation of results of measurement (quantitative data) and is of particular interest to manufacturing industry wherever articles or components are produced in quantity with dimensional limits of accuracy.

The second part concerns the classification of a product by quality (qualitative data) and it is of use wherever sampling technique can be applied to regulate production.

* B.S. 2564: 1955, "Control Chart Technique." British Standards Institution. 10s. 6d. net.

A Year's Research on Food

FOOD INVESTIGATION ORGANISATION REPORTS ON . . .

- *Food from micro-organisms*
- *Strength of egg shells*
- *Poultry preservation*
- *Frozen beef quality*
- *Spoilage of canned ham*
- *Browning of dehydrated meat*
- *New test for fish freshness*
- *Electrostatic smoking of fish*
- *Antibiotic ice for fish storage*
- *Efficiency of fruit cold stores*

CO-OPERATION between the food industry and its research organisations is the theme of the new report of the Food Investigation Organisation. Industry must realise that successful research sometimes calls for radical changes in existing organisation and methods, while research workers must be sympathetic to industrial problems and must be in a position to speak the language of the practical man.

Broadly there is a central core of research more or less closely related to specific types of commodity. These basic studies interlock with applied research and developmental activities and it is at this stage that co-operation with individual firms or whole sections of industries is most useful.

The clearest expression of this pattern has been reached with the group of industries handling, storing, processing and distributing fish. This is due to the mutual confidence between the F.I.O. and two other bodies, the White Fish Authority and the Herring Industry Board. Together these organisations cover all sections of the industry, while a further aid to co-operation has been the priority given to the development of the Torry and Humber laboratories since 1946. Their resources have approximately trebled since that date.

The work of the Food Investigation Organisation is carried out in four divisions—General (Biochemistry and Biophysics), Meat, Fish, and Fruit and Vegetables—and the report is presented under these headings.

Biochemistry and biophysics

At the Low Temperature Research Station two methods for using micro-organisms as a source of food have been considered—the use of unicellular algae capable of photo-synthesising organic matter from carbon dioxide and water, and the growth in deep culture of edible fungi of the mushroom species. Laboratory experiments have shown that two salt water species of algae (*Dunaliella*) give yields approaching those obtained earlier with *Chlorella*, the most promising micro-organism found up to now. However, it is unlikely that mass cultivation of algae to produce protein, fat or carbohydrate could be successful in this country. The climate is not sunny enough.

Experiments with fungal mycelium grown in artificial conditions proved that strains of several well-known edible fungi grow well and, what is more important, have a good flavour. Further experiments on the deep cultivation of these strains are being carried out. The possible use of micro-organisms for purposes other than direct food production has been considered, in particular the use of bacteria and fungi to synthesise ascorbic acid. However, the evidence that bacteria produce ascorbic acid is slender and while such unicellular algae as *Chlorella* contain traces of the acid, it can only be extracted with difficulty.

In collaboration with the National Research Development Corporation, semi-technical scale trials were started of a process using ion-exchange columns for the recovery of ascorbic acid concentrate as a by-product from lucerne drying. Although the process was technically feasible it was too expensive to be attractive in commercial competition with synthetic ascorbic acid. However, an alternative technique is being developed which employs multiple ion-exchange membrane cells in which the ions in solution are caused to migrate through selective membranes under the influence of an electrical potential. The process would thus become continuous and the costly regeneration of large quantities of resin with chemical solutions avoided. A demonstration plant is to be built at the Low Temperature Research Station.

Other examples of research by the L.T.R.S. include studies on the chromatographic separation of phospholipids and, in collaboration with the Brewing Industry Research Foundation and the Ministry of Food, the preparation and study of concentrated beer, prepared by partial freezing.

Research on the strength of egg shells showed that shells differed among themselves not only in thickness but in hardness and brittleness. On the average, unusually hard and strong shells contained about 14% more magnesium than unusually soft and weak shells.

Work on the preservation of poultry has started. The effects of cooling birds by immersing them in mixtures of ice and water—a method which is rarely used in this country though popular abroad—are being studied.

More knowledge of the chemical

constituents of food plants is needed and progress has been made in the identification of the phenolic constituents which are responsible for astringency and contribute largely to the colour of fruits and vegetables. Similar compounds are also found in lignin, which, when present in cell-wall, makes vegetables unpleasantly tough. Work on the metabolism of peas and on gummosis of plums took place during the year. It has been shown that stone gum in plums is a product of the tree itself, though its formation may be stimulated by pathogenic micro-organisms. Investigations are continuing on enzymic and non-enzymic browning of vegetables.

Meat and meat products

The first series of experiments with beef carcases carried out in co-operation with the C.S.I.R.O. in Australia have now been finished. Preliminary results seem to show that commercially important differences in quality arise from specific and controllable differences in the treatment of animals and carcases. Beef carcases can be frozen immediately after slaughter and the freezing process completed in 24 hr. without affecting drip. The normal practice is to chill them and then to freeze, the whole process taking 5-8 days. Other findings are that pre-slaughter injections with phosphate result in more tender meat and that similar injections with magnesium sulphate result in less drip on thawing.

Quality studies were also made with fresh meat, dehydrated meat and on canned hams. One of the factors which influences the quality of meat is its water content, which can be affected in several ways before the death of the animal. For example, fasting for 24 hr. will produce a loss of 3·2 lb. of carcase weight with a 200 lb. pig and paradoxically, if the pigs have been watered *en route* to the abbatoir they will lose an extra 4 lb. of carcase weight due to the extra loss of salts from the muscles, which thus have their capacity to hold water reduced. In co-operation with the Fatstock Marketing Corporation plans have been made for a full investigation of the carcase shrinkage of meat animals both *en route* from farm to abbatoir and when resting in lairages. The evaporation of water from sides of beef during their cooling is also being studied.

When dehydrated meat is stored at tropical temperatures it goes brown and develops undesirable flavours due to the interaction of proteins and amino acids with reducing sugars. The reducing sugars may be present as free sugars or as phosphate esters and the production of these sugars and esters was studied in muscular tissue *post mortem*. Broadly, some residual glycogen remains after the main process of its conversion into lactic acid is completed and this glycogen will produce sugar. Work on rabbit and horse muscle is being extended to a study of muscular tissue from cattle, sheep and pigs. Studies on *rigor mortis* in relation to the growth of anaerobic bacteria in meat was also studied.

Considerable spoilage of canned hams has been traced to the presence of faecal streptococci, and a detailed study was made of several hundred strains isolated from spoiled hams, from a bacon factory and from the intestines of a pig. It was found that the spoilage organism in the ham was usually *Streptococcus faecium* which was also the predominant faecal streptococcus in the intestines of the pig. The closely related *Streptococcus faecalis*, characteristic of human faeces, was found in the bacon factory at points where the carcases were handled by the slaughterhouse men. It seems that this may be overcome by good factory hygiene and bacteriological control of such added substances as gelatine.

Fish and fish products

At the Torry Research Station, the first permanent building has now been occupied. The Station's new diesel-electric trawler, named the *Sir William Hardy* after the first Director of Food Investigation, has been completed. The vessel is the first British diesel-electric trawler. It is equipped for trawling on a commercial scale as well as for some other common fishing methods, and also for testing, freezing and other processing at sea. There is laboratory accommodation for chemical, bacteriological and other investigations. The ship has a fuel endurance of at least 25 days so that visits to all the North Atlantic fishing grounds will be possible.

A simple test of fish freshness has been devised at Torry. Experiments had shown that certain colourless tetrazolium compounds might be used in assessing fish quality because they are reduced by bacterial dehydrogenases to red formozans. The depth of the colour and the speed of its development depend on the total bacterial activity. Test papers impregnated with the tetrazolium salt were laid on the wet surfaces of the fish at various stages of spoilage in ice. The depth of the colour produced within a fixed time was determined against standard papers. The quality of the fish was also assessed by its appearance, smell and so on.

It was found that very fresh fish produced no colour, while very stale to putrid fish quickly turned the test paper a deep purplish-red. The tests are being continued with other species of fish, fish from other fishing grounds and fish picked at random from various markets.

Torry also carried out experiments on the use of ice containing aureomycin for the preservation of fish. Ice with an average of about 4·5 p.p.m. of aureomycin improved preservation; fish stored in this mixture kept about 7 to 10 days longer than usual. Cooking seems to reduce the amount of antibiotic to traces, but it is still not certain that even such small quantities continually eaten would have no harmful effect. It is possible that if therapeutic antibiotics are used in food the causative organisms of disease may become resistant.

Application has been made for a patent for a new method of smoking fish. The smoke particles

(*Turn to page* 334)

Quality Control of Margarine

A NEW laboratory has been installed at the Purfleet factory of Van den Berghs and Jurgens Ltd., makers of *Stork* margarine. Costing about £20,000, it replaces the cramped temporary quarters occupied by the laboratory staff since the disastrous East Coast floods of a few years ago.

Although many new and improved features are incorporated, such as a constant temperature room for rheological work on margarine and cooking fats, works control is the primary function of the new laboratory. Research work in the U.K. takes place at the Unilever laboratories at Colworth House, Sharnbrook, and at Port Sunlight. The new Purfleet laboratory is mainly concerned with quality and bacteriological control in the factory, although a certain amount of development work is carried on. Works control is not confined to the factory's products, but covers every aspect of production, *e.g.* boiler water is tested for softness, and coal deliveries are analysed in the laboratory.

The 3,500 sq. ft. of floor space are divided into a main laboratory and 10 subsidiary rooms. Corrosion in the laboratories is minimised by using stainless steel equipment wherever necessary. The main laboratory handles the chemical analysis required for the routine control of raw materials and the packed margarine. Here also is located the specially designed equipment for refining samples of raw oil. Margarine is manufactured from vegetable oils which have been purified by successive neutralising, bleaching and steam deodorising treatments; these treatments are simulated on a small scale with this refining equipment, enabling the quality of the oils used to be assessed and controlled.

Among the smaller rooms are the vitamins laboratory and the bacteriological laboratory. Vitamin assays are carried out by means of an ultra-violet spectrophotometer. After checking in the laboratory, the concentrated vitamins A and D are diluted with refined oil and mixed in the required proportions to a strength suitable for inclusion in the margarine, which is in addition continuously tested to ensure that its vitamin potency is maintained at the appropriate level. The colouring matter (carotene) used in the margarine also has vitamin A activity and it is similarly assayed with the spectrophotometer.

The new main laboratory at Purfleet.

The bacteriological laboratory, where the milk used in the company's products is tested and where the cleanliness of the factory is controlled, is equipped with its own sterilising room. A strict bacteriological control is maintained over the manufacturing plant and the margarine; also the special dairy cultures used for developing flavour and aroma in the milk are prepared and propagated in this section. The roll tube technique for colony count determinations is used to cover the large number of samples examined each day.

Chilly winter or tropical summer conditions can be maintained in the constant temperature room which is used for storage trials on packed margarine. Rheological apparatus of special design has been installed for testing and estimating the plasticity and texture of the various products. The room is thermostatically controlled at any desired testing temperature and is insulated with 6-in. cork slabs and double glass windows. Air is continuously circulated and heated or cooled to the required temperature.

Care has been taken throughout the design of the laboratory to combine the maximum flexibility with efficient safety measures. The laboratory can be modified to suit changing requirements of products and processes by the use of benches equipped with movable metal unit fitments. Precautions against fire include flame-proof lighting and electric wiring, and a flame-proof exhaust fan and steam heating are installed in the inflammable solvents laboratory.

The Coleford factory of H. W. Carter and Co. Ltd., makers of fruit drinks, is featured in a recent issue of *The Brook*, quarterly magazine of Brook Motors Ltd. Brooks motors are used to power many of the machines in the factory, including the regeneration mechanism, pasteurisation plant, refrigeration plant, bottle washing, filling and capping machines. The article reports on some of the scientific work on fruit syrups and fruit juice processing carried out by the technical director, Dr. V. L. S. Charley. Dr. Charley is the author of "The Cider Factory" and "Principles and Practice of Cider Making," both published by Leonard Hill Limited, proprietors of FOOD MANUFACTURE.

Food Research

(from page 332)

are given an electrostatic charge by passing the smoke through an intense electric field and the smoke is then introduced to the fish chamber. The fish are earthed so that the charged particles fly to them and are deposited all over their surfaces. Smoking is much more rapid and even. The method has already been applied on a small scale.

Fruit and vegetables

The Ditton Laboratory is particularly concerned with two problems in the storage of home grown fruit. These are the reduction of lenticel rotting of Cox's Orange Pippin apples and the loss of water from apples when stored. Work on the effect of growing conditions and weather on the storage life of fruit is continuing.

Work on cold storage techniques has included the study of the possibilities of pre-cooling fruit as soon as possible after picking and of transporting it in air enriched with carbon dioxide. An experimental container which could be transported by rail or road is being constructed so that tests can be made to determine the best conditions for long-distance transport.

Two blocks of two 50-ton stores have been used in tests to discover the overall heat leakage into the stores. It was discovered that for corkboard insulation the heat leakage was 30% greater and for foamed concrete insulation the heat leakage was 50% greater than the leakage calculated from the difference in temperature between the inside air and outside air. It is believed that the discrepancy is due to insufficient allowance being made for solar radiation to exposed walls and roofs. Precautions against solar radiation should cost little and are advisable.

It is possible that many existing refrigeration plants are operating inefficiency. In one plant inspected, the air-cooled condenser unit was not receiving enough clean cool air and a simple rearrangement of the air supply brought about a saving of 25% in power consumption.

Fruit and Vegetable Processing

THE work covered by this book* is the result of eight years of study of the freezing, preservation and canning of fruit and vegetables and the dehydration of vegetables. The author is director of the Munich Institute of Food Technology and Packaging and he has, as a contributor, Dr. H. Righi, formerly of the same Institute.

The text, which is in German, is divided into three main parts, the largest dealing with the freezing of fruit and vegetables, and the others with the drying of vegetables and the determination of canning conditions.

The part concerning quick-freezing is well documented and thorough and is well illustrated with tables, graphs and charts. The various methods of freezing are dealt with and valuable details are given about blanching, vitamin C retention and peroxidase activity. Particular attention is paid to the organoleptic evaluation of frozen fruits and vegetables during storage and after various treatments. Methods of freezing a wide range of produce are described. Of special interest is the section on the physical chemistry of freezing and the subjects of freezing rates, storage changes and penetration of sugar.

In the section on the dehydration of vegetables the methods of drying almost every type of vegetable are presented in a lucid manner.

Blanching prior to drying receives a thorough treatment and the following table gives an example of the type of information given:

	Optimum blanching time (secs.)	*Optimum drying temp. (°C.)*	*Maximum air drying temp. (°C.)*
Green cabbage	40	35-52	75
Peas	60-80	55-65	75
Mushrooms	Nil	40-80	80
Celery	90	53	?
Potatoes	100-300	53	75
Onions	Nil	40-60	75

* *Fortschritte in der Technologie des Konservierens von Gemüse und Obst.* By Dr. Rudolf Heiss. Serger and Hempel, Brunswick. 1955. Pp. 228. Illus. DM. 16.20 net.

An interesting German machine of the continuous steam blanching type is illustrated and described.

Storage conditions and changes occurring therein are discussed and the following figures represent the optimum moisture content for vegetables during nine months' storage at 20°C. for optimum quality retention:

	Moisture content %	*Equilibrium humidity* %
Green cabbage ..	7	5
Celery	5-6	20-35
Mushrooms ..	5-7	15-40
Carrots	7	43
Peas	6-8	25-45

The final part covers the determination of sterilising conditions for canned foodstuffs and it is a most admirable summary of up-to-date information. Every phase of this vital stage of investigative technique is dealt with thoroughly and particularly ingenious is the apparatus used to determine the elastic deformation of cans and lids during processing. Mathematical treatments are given of the methods of Riedel and of Olson and Schultz for the conduction processes together with details of methods of studying the pressure changes occurring during canning. Examples are given of the calculations for cooking and cooling periods of canning and even the gas content of fruit and vegetables is considered.

The only criticisms to be made after a preliminary reading of the book are that no index is provided (although there is a detailed contents list) and that section I in the contents has been designated section J in the book with consequent omissions in each case of the alternative letter.

This book can be recommended to British food technologists. An English translation is desirable.

J. D. DEVEY.

The 1955 *Mazda* lamp catalogue is now available. Over 1,500 of the more important lamps in the standard *Mazda* range are listed in groups and indexed under sections. Each section consists of two facing pages, with illustrations, descriptions and tabulated technical data in three well-defined groups for quick reference.

Advances in Food Technology

CANNED HAM

Hygienic Processing

The temperature used for the canning of ham is not high enough to ensure complete elimination of heat-resisting organisms. Thus it is essential to keep the ham destined for canning as clean as possible.

Research at the Institute for Food Hygiene at the Free University of West Berlin has shown that methods used in some plants for the cleaning of smoked ham before canning sometimes have the opposite effect. Lowest germ counts were found on ham exclusively conveyed and smoked in a suspended position. Washing with luke-warm or cold water is useless; brushing is worse than useless as it has the effect of entrenching the germs more deeply. The best method is to expose the ham to a sharp jet of luke-warm water, suspend it on a hook and dip it in boiling water for 5 sec.—M. Lerche, *Die Fleischwirtschaft*, 1955, **7**, 101.

FISH CANNING

Raw Packing Sardines

After about 75 years the basic method of preserving the Maine sardine has been changed so that the fish is cooked inside the can by a new process. The conventional method was to cook the fish immediately upon arrival at the factory, cut off the heads and tails, can the cooked fish, adding oil, seal the tops, and cook them again. In the new process, invented by Mr. Sam Zwecker, the heads and tails are removed from the fish and they are placed in open cans which are then put on wire trays carried on a special truck which allows the trays to be secured in such a manner that when the body revolves all liquid, consisting of fluids issuing from the fish and from salt water, drains from the cans. In this position, with the cans facing down and continuing to drain, the truck and its cargo of fish are steam cooked for about 15 to 20 min. at 220°F. They are taken away to dry, oil is added and the cans are sealed. After sealing, they are cooked for another hour and proceed to the can washers, the testing bins and eventually to the packers.

It is claimed that this process is no more expensive than the usual method, that it reduces impurities in the pack, enhances the appearance of the fish and permits a highly sanitary operation.—*The Canners*, 1954, **119**, 22, 14.

CAROTENE

Extraction from Palm Oil

Six methods are now available for the extraction of carotene from palm oil. The oldest is the saponification method whereby the unsaponifiable fraction containing the carotene is extracted by saponifying the major part of the glycerides. In spite of considerable recent improvements, this method has a relatively small extraction efficiency, although it has certain compensating advantages. A second method, based on the use of iodine which forms an insoluble compound with carotene, has not proved successful as it has not been possible to isolate the biologically valuable carotenes. More successful has been a method based on the use of urea. A fourth method, using the adsorbents which play a part in the processing of palm oil for food, is complicated and expensive. Newer methods are based on the use of selective solvents such as liquid propane (*Solexol* process) or furfural. Efforts, hitherto not very successful, have also been made to extract the carotene by means of molecular distillation.—M.-T. Mellier and M. Servant, *Oléagineux*, 1954 (12).

FROZEN FOODS

Maintaining Quality

Sauces and gravies will retard oxidative deterioration in a frozen food pack simply through the displacement of air. However, until the development of waxy rice flour and other specialised thickeners, sauces and gravies themselves suffered from such physical breakdowns as liquid separation and curdling while in cold storage.

Oxidation is a particular problem with frozen foods in which palatability factors must largely be developed during processing and not during cooking as in conventional foods.

Soya bean flour and turkey fat act as antioxidants in some foods, while ascorbic acid, butylated hydroxy anisole, butylated toluene and propyl gallate are also useful. The antioxidant effects of monosodium glutamate have been recognised but not explained.

Vitamin retention studies of frozen foods show that B vitamins survive normal cooking, freezing and pre-heating, while vitamin C may be lost and fat-soluble vitamins destroyed by rancidity.

Bacterial standards, which are easy to measure, are probably the best means of judging quality. A typical standard (set by the U.S. Army Quartermaster Corps) allows a maximum count of 100,000 per g. for pre-cooked frozen meat and a coliform count of less than 10 per g.

Storage temperature has an important bearing on the quality of frozen foods but unfortunately cannot be standardised at consumer or retail levels. Time-temperature indicators based on chemical, enzymatic and bacteriological principles are in existence, but there are doubts about their applicability.—*J. Agric. and Food Chem.*, p. 18, Jan. 1955.

PRESERVATIVES

Paper-chromatographic Detection

The Central Laboratories of the Margarine Union Ltd., Hamburg, have developed methods for the paper-chromatographic detection of certain food preservatives. With these methods, it is possible, for instance, to identify benzoic acid and dehydro-acetic acid and their sodium salts in margarine by means of a one-dimensional rising chromatograph using NH_3—saturated butanol as a fluid phase after staining the chromatograph with an alcoholic bromo-cresol solution. Similarly, the methyl, ethyl and propyl esters of the *p*-oxy-benzoic acid can be identified. A similar method can be used to identify dehydro-acetic acid in the lacquer film of aluminium foil used for packing foodstuffs.—W. Clemens, *Fette, Seifen Anstrichmittel*, 1955, **57**, 109.

LARD

Detection of White Grease Adulteration

No method of detecting "white grease" adulteration in lard can be regarded as completely reliable, since the chemical reactions used as criteria can be too easily influenced by foreign matter accidentally in touch with the lard. Even a recently advocated method of using the neutral-red reaction under the ultraviolet light as a criterion (see FOOD MANUFACTURE, **29** (10), 410, 1954) is too ambiguous. The Netherlands Research Centre has had good results with a new method, which employs the specific electric conductivity as a criterion, as it has been found that the electric resistance of refined and non-refined oils and fats differs greatly. The difference is the greater the higher the temperature during the test. The electric resistance is therefore measured at 100°C. in a metal container of known capacity. The higher conductivity of non-refined products is believed to be due to traces of phosphatides, etc., which are removed during the subsequent refining process.—S. H. Bertram, *Die Fleischwirtschaft*, 1955, **7**, 69.

STERILISATION

Cathode Ray Effects on Vitamins

A high vitamin, semi-synthetic diet was fed to limited numbers of three generations of mice after (*a*) no treatment, (*b*) steam sterilisation, and (*c*) cathode ray sterilisation. Vitamin losses were more severe in the steam sterilised diet than in the cathode ray sterilised diet. General appearance, growth and reproduction were similar in all three groups of mice to give biological evidence of the nutritional adequacy of the sterilised diets.—T. D. Luckey, M. Wagner, J. A. Reyniers and F. L. Foster, *Food Res.*, 1955, **20**, (2), 180.

ORANGE JUICE

Frozen Concentrate

According to workers of the Minute Maid Corporation, Plymouth, Florida, commercial packs of 58·5° Brix concentrated orange juice have been made successfully. A 58·5° Brix (6-fold) product was chosen because it fulfilled all requirements of practicability such as ease of reconstitution, stability of cloud and flavour, and efficient manufacture.

The cloud of 58·5° Brix concentrated orange juice with pulp content of 10-12% stored at 80°, 60°, and 40°F. was considerably more stable than that of 42° Brix concentrate. Heat stabilised concentrate is more stable than non-heat stabilised concentrate. Flavour stability of 42° Brix products is greater than their cloud stability, while, on the other hand, cloud stability of 58·5° Brix orange juice exceeds its flavour stability. The flavour stability of 58·5° Brix juice was greater than that of 42° Brix. Thus, cloud stability can be used as an index of quality of 42° Brix product, while flavour stability should be used as the primary index for 58·5° Brix product quality.

Vitamin determinations indicate that vitamin C is highly stable in 58·5° Brix product. Viscosity and freezing data are presented.—DuBois and Murdock, *Food Tech.*, 1955, **9**, (2), 60-63.

DRY SAUSAGE

How Temperature and Salt Influence Quality

Research carried out at the Institute for Veterinary Food Research of the Justus Liebig College, Giessen, has again emphasised the importance of a judicious control of temperature and salt content during the processing of dry sausages. The temperatures to be controlled must be those of the sausage mix, the smoke and the processing, drying and store rooms. Optimum conditions are obtained with room temperatures of 12 to 15°C. This temperature is too low for the growth of *Mesentericus subtilis bacilli* which are the main cause of spoilage, but it is just right for the correct measure of growth of flavouring bacteria to which the aroma and flavour of dry sausage are due. The salt content is of smaller influence than the temperature, but optimum conditions are obtained with a common salt content of 3·2%.—H. Keller and S. Baldenius, *Die Fleischwirtschaft*, 1955, **7**, 99.

ANTIOXIDANTS

2,6 Di-tert. Butyl-4-Methyl Phenol

In recent years, 2,6 Di-tert. butyl methyl phenol (DBP), an antioxidant used in the rubber and petroleum industry, has been introduced in the food industry. In lard, a 0·02% concentration of DBP has about the same effect as 0·01% dodecyl gallate (DG). Slightly better results are obtained with a combination of 0·01% DBP and 0·005% DG. In storage tests at 29°C. with lard wrapped in paper cups, DBP has shown good results even in a 0·01% concentration. It is an important advantage that protection is also afforded to the grease in contact with the paper. The antioxidants must also be assessed organoleptically. In milk powder, DBP has been tested organoleptically, especially after the boiling of the milk. A 0·01% concentration of DG gave best results.—*Fette, Seifen, Anstrichmittel*, 1954, **56**, (11).

Machinery and Equipment

Auger conveyor

While they do not claim that the use of a screw conveyor for handling granular materials is new, Opancol Ltd. say that the design of their *Quicklift* auger conveyor has resulted in a new cheap conveyor with a large throughput. The new conveyor costs less than £40 and is said to be light in weight, portable, adaptable and cheap to run. All components are packed in units to facilitate quick despatch, and all parts are jig-built for interchangeability of the components.

Multi-duty mill

A multi-duty mill capable of a wide range of processes such as wet or dry grinding and mixing, shaking, or polishing, has been produced by Podmores (Engineers) Ltd. A number of different attachments can be supplied to fit the standard three-speed driving unit, a feature which makes the unit economical in a small laboratory where a single-purpose machine would not be justified. As the laboratory expands additional units can be added for specific jobs; the flexibility always remains, however, to meet sudden demands for a certain process.

The standard motorised driving unit consists of a substantial casting, housing the motor and cooling fan, three-speed drive and oil-immersed worm reduction gear. The worm shaft is carried in general duty ball-races and the main shaft in heavy oil-immersed bearings. The shaft carries face-plates enabling the complete range of single or double units to be used. In addition to the motorised driving unit, a unit with fast and loose pulleys and striker gear for driving from an existing line-shaft can be supplied.

Proteins from plant waste

A mechanical process for the extraction of nutrients from grass and other vegetable matter was demonstrated by E. H. Bentall and Co. Ltd. at a reception to celebrate their 150th anniversary recently.

The process, which was invented by the late Mr. W. T. Powling and his son and was described in FOOD MANUFACTURE, January, 1953, permits the mechanical separation of moisture, fibre and a nutrient concentrate called *Protess* from vegetable waste. It is claimed that *Protess* contains a high proportion of proteins, fats, minerals, and vitamins with a balance of carbohydrates and that it provides a cheap supplementary protein for pigs and poultry. The extension of the process to provide food for humans is envisaged.

Since the death of Mr. W. T. Powling the staff of Powling Patent Processes Ltd. have merged with that of E. H. Bentall and Co. Ltd., and Mr. W. T. L. Powling has been appointed extraction plant development manager, working directly under Mr. D. P. Ransome, managing director of Bentalls. Mr. J. Lucas of the Powling Co. is Mr. Powling's assistant manager.

Vacuum filling and capping machine

Fords (Finsbury) Ltd. and Graham-Enock Manufacturing Co. Ltd. have co-operated in the design and production of a new capping unit to be built into the whole range of *Gem-Cemac* vacuum fillers. The companies emphasise that this is more than just fitting a standard Ford Capper to the *Gem-Cemac* filler; it is, in fact, a specially designed unit.

The entire working mechanism containing the precision press equipment is housed in a solid stainless steel casting, machined and polished, and incorporated into it is a system of positive mechanical lubrication, which guarantees results without the need for much attention. The unit incorporates a horizontal sub-press for cutting, forming and embossing caps, but apart from this and a different arrangement of the foil-feed, the *Gem-Cemac* filler is a replica of its predecessor.

The new capper will be offered with Ford's guarantee of 50 million caps, and thin foil down to ·040 mm. gauge can be used with reliability at speeds up to 15,000 bottles/hr., and any cap size from 36 mm. to 56 mm. dia.

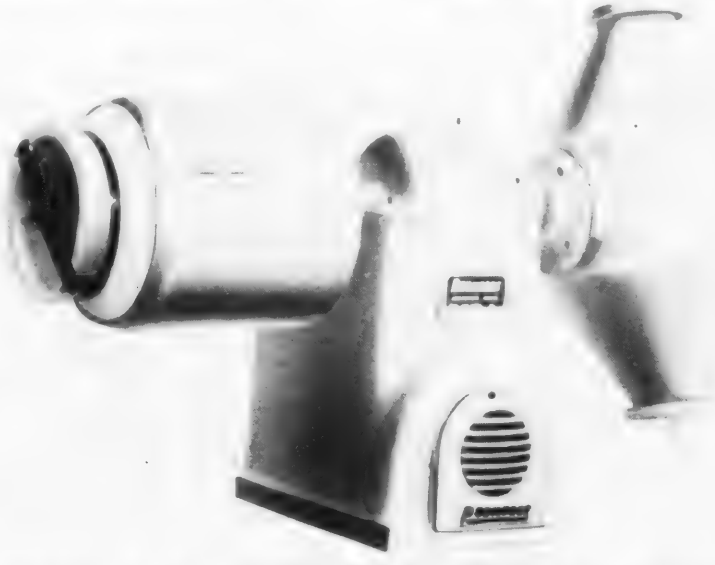
The capper is styled to blend into the filler and to be an integral part of it. The capper is mounted above the sealing heads and its mechanism driven through an overload device and positive clutch actuated by a bottle entering the sealing head. Caps are, therefore, only made when there are bottles to seal. The cap slides down a short vertical chute into position over the mouth of the bottle, after which it is firmly sealed on to the bottle. The raising and lowering of the filler and capper for different sizes of bottles continues to be synchronised and electrically operated.

The previous guarantees by which both companies covered their equipment still remain in force.

Immersion heat exchanger

The problem of controlling an exothermic reaction is said to be simplified by an immersion heat exchanger introduced by Q.V.F. Ltd. With the increasing size of glass chemical plant, this problem has been intensified, since with the increase in size of spherical vessels, the outside surface area available for cooling does not increase in proportion to the volume.

The new unit enables heat transfer



Multi-duty mill with porcelain grinding pot and double conical dry mixer attachments.

elements to be introduced inside the vessel and is claimed to simplify operation control and to offer a means of heat transfer which is independent of the containing vessel walls. Normally the heat exchanger is admitted into the vessel through a 6-in. bottom opening, with the cooling element disposed just below the liquid level when the vessel is half full.

Though primarily developed as a cooler for exothermic heat, the immersion heat exchanger unit is also said to be suitable as a steam heater. It can also be used in conjunction with an electric heating mantle to accelerate heating-up time.

Lighting in an abattoir

Two standard designs of G.E.C. fluorescent fittings have been used successfully for the specialised task of lighting the public abattoir at Nottingham. These are a slotted top reflector which is suspended from girders in the roof, and an angle reflector which in this installation is supported by wall brackets. Both designs accommodate one 5 ft. 80W tube in special sliding lampholders designed to facilitate replacements, and have a white vitreous enamel finish. The tubes are Osram New Warm White.

The fittings have been positioned to give the best possible lighting at the various working points, and the operatives are very satisfied with the results. A good working light in the vertical plane is ensured by the angle fittings, and shadows are luminous. Average illumination over the whole area is between 12 and 15 lumens/sq. ft.

Particle size distribution analyser

Sharples Centrifuges Ltd. are now marketing the Sharples Micromerograph in the U.K. and Europe for the first time. The Micromerograph is manufactured in Philadelphia, and had previously only been sold in the U.S.A.

The instrument, designed for accurate, rapid, and reproducible particle size distribution analysis, is an automatic, self-recording, sedimentation balance type device. It can be used in production and quality control and as a research instrument. Its statistical accuracy for routine testing is high owing to the several billions of particles in the sample utilised (approximately 1/10 g.). The operating range of the instrument encompasses a wide variety and size range of powders. In production control the Micromerograph can be used for keeping the particle size distribution of powders within safe or acceptable limits. Limits once having been established, non-technical operators can quickly check a size distribution curve against a transparent overlay showing the area of acceptability. The Micromerograph chart and the derived particle size distribution curve form permanent records for future reference. Purchase orders for powders can specify Micromerograph curve limits, and the distribution curve of a material tested on the seller's instrument can be expected to agree closely with one made on the buyer's.

In any research or development programme involving the behaviour of powdered materials, the rapidity with which determinations can be made and the dependability of the results allows the research programme to operate at many times the rate of progress that is possible with conventional particle size methods. The application of the Micromerograph to problems involving penicillin for human use, tungsten carbide for cutting tools, and limestone for pigments, are but a few instances of its wide usefulness. In most research applications the continuous data record of the Micromerograph is of great value.

G. E. C. fluorescent lighting in the public abattoir at Nottingham, showing one of the two stunning pens in right background.

Die-cast baking pan

A new baking pan, which has taken two years to evolve, has been introduced by Procea at their Hay Mills, Birmingham, bakery. The new pans are made of die-cast aluminium alloy. They are considerably stronger and lighter than those generally used and, being seamless, can be cleaned more thoroughly. Another advantage is that when the pans need to be reglazed, the existing *Silicote* film, which prevents the bread sticking to the pan, can be removed by shot blasting, an improvement on cleaning by detergents, etc.

Although made individually, the pans are used in sets of six, being strapped together by a special welding process which gives a high degree of strength. They were developed jointly by Procea and the makers, Alumasc, Ltd.

Bin bogie

A handling device which will enable drums, vats, dustbins and other containers up to 18 in. diameter to be easily moved has been introduced by Powell and Co. under the name *Bin Boy*. The bogie is fitted with four swivel castors with all-rubber wheels, and it is claimed that with it a girl can easily push a container of 1¼ cwt. on a level floor.

Radio frequency ovens

Starch-reduced rolls, which normally take two days to dry in air-conditioned rooms, are said to be dried to a constant moisture content in 30 sec. on *Radyne* drying conveyors. Radio Heaters Ltd. claim that their conveyorised drying/heating ovens are equally suitable for drying a number of other foods, for pre-heating, de-infestation of nuts and similar materials, for sterilisation and re-heating of foodstuffs.

The ovens consist of a series of very high efficiency 35 mc/s 5/6 kW radio frequency heating generators connected by a conveyor unit. With three R.F. generators up to 45 lb. of moisture/hr. can be evaporated. Where the material has to be raised from room temperature to drying temperature, the weight of moisture will be slightly less.

Time-temperature controller

There is practically no limit, claim the manufacturers, to the time-temperature programmes which may be accomplished by using their new programme controller. This addition to the Honeywell and Brown range of industrial instruments is the *ElectroniK* circular chart cam-operated programme controller. It utilises a transparent plastic cam, the contour of which is shaped to the desired time-temperature

pattern. When the cam rotates a cam roller with a follower arm continuously transmits its contour to the instrument control set point.

It is claimed that wherever material is heated (or cooled) at a fixed rate, held at the same temperature for a certain period, then again cooled (or heated) at a controlled rate, the programme controller ensures uniform reproduction of the operation. Variables such as strain, weight, speed, etc., can be similarly programmed.

Typical process applications of this instrument include drying, polymerisation and retort cooking.

Electronic air filter

An electronic air filter designed for use in small air-conditioning units has been produced by Air Control Installations Ltd. The filter, which is called the *Electro-Klean*, is based on the application of an electrostatic charge to a unit-type filter cell containing a pleated mineral fibre medium and a separate power pack. The unit consists of a mild steel frame containing one or more filter cells. These cells are supported in the frame between two metal grids, one charged and the other earthed, which produce a strong electrostatic field in the filter media to attract and hold the dust and smoke particles. The cells consist of a mineral fibre filter medium composed of fine filaments compressed into a thin porous sheet which is bonded at each point of contact and accordion pleated. The edges of the pleated medium are coated with a metallic compound that serves as a conductor for the electric potential so that the charge is uniformly distributed over the whole cell.

When the cells acquire their full dust load they are removed and replaced.

Electronic air filter for small air conditioning units.

Pneumatic flour handling

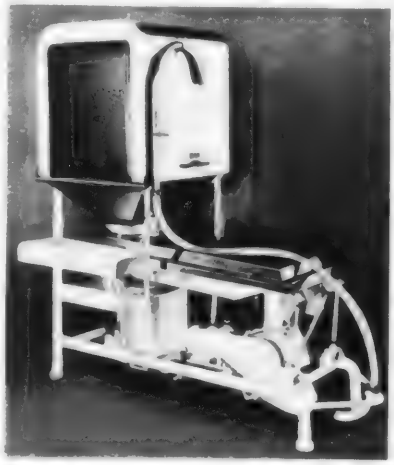
A machine for pneumatically delivering clean, aerated flour direct either to dough mixers or storage bins has been put on the market by the J. H. Day Company of Cincinnati.

The sifted flour is delivered to a low-pressure air system which carries the material to its destination. Tailings are deposited in an easily emptied compartment.

The machine is said to require only 4-12 lb. air pressure and only 10 c.f.m. to convey 100 lb. per min. This low air consumption precludes the necessity of installing supplementary air equipment.

The hopper has a capacity of 120 lb. and is covered by a dust hood.

The air installation includes a reducing valve which reduces pressure when necessary. There is also a by-pass valve to permit purging at full line pressure for cleaning the entire system. Also there is a diverting valve for permanent installation to permit the feeding of two or three destination points.



Flour handling machine. Clean, aerated flour is delivered pneumatically direct to dough mixers or storage bins.

Generating equipment for sugar factory

A new power station has recently been put into commission by the Ste. Madeleine Sugar Co. Ltd. at the Trinidad factory managed by Henckell du Buisson and Co., London, where something like 56,000 tons of sugar are produced annually.

The generating equipment consists of two new BTH 1,250-kW. C.M.R. 3,600-r.p.m. single-stage back-pressure steam-turbo sets having two rows of rotating buckets; and one existing BTH 1,000-kW. set which has been transferred from the old generating station to the new power house.

Steam conditions of the new sets are: normal conditions 165 p.s.i.g. superheated 100°F. exhausting against a back pressure of 10 p.s.i.g. The machines are also capable of carrying their c.m. rating at 140 p.s.i.g. with 50°F. superheat. The electrical conditions are: 480 volts, 60 cycles, 3 phase, 0·8 p.f. (1,563 kVA.), with direct-coupled exciter; an enclosed air-cooling system is embodied.

A completely new BTH switchboard has been installed in the power station, an interesting feature of which is the use of electronic voltage regulation.

Lifting metal-capped containers with the "Permalift" magnetic lifter.

Magnetic lifter

A device by which an operator can remove and release by the compression of a handle a complete layer of metal-capped containers from their surrounding cartons has been introduced by Rapid Magnetic Machines Ltd. Called the *Permalift*, it consists of two spring-loaded plates, normally held together, one having permanent magnets located to register with the containers to be lifted and the other clearance holes through which the magnets protrude. The equipment is placed on the layer of containers and lifted. When the handle parts are compressed the containers are released.

Electronic meat tester

The flesh structure of live and dead animals can be measured by a new electronic device according to the Purdue University Agricultural Extension Service and Experiment Station. It is claimed that the instrument, which has been designed by Dr. F. N. Andrews and Dr. R. M. Whaley of the Station, measures the thickness of fat and lean layers of meat.

The instrument is a needle-type electrode which pierces the flesh of the animal and reacts differently in fat or muscle tissue according to the electrical properties of each layer.

News Digest

Food technology at Birmingham meeting

IN GLORIOUS summer weather, the Society of Chemical Industry held their 74th Annual Meeting in Birmingham last month. There was a near record attendance of about 600 members and their guests. The full and varied programme included visits to food factories and a lecture on quality control in the food industry.

During the meeting the president of the society, Sir William Ogg, director of Rothamsted Experimental Station, retired after his two years in that office. He is succeeded by Mr. Julian M. Leonard, who has been hon. treasurer of the society for many years.

Synthetic foods. In his presidential address, Sir William Ogg discussed the prospect of synthetic foods being produced to feed the rapidly growing world population. "The chemist can already make sugars and fats synthetically, but not at a cost to compete with natural products," he said. Experiments were being carried out on the extraction of leaf protein. As the population increased and had to depend more and more on vegetable protein it was desirable to know how to extract a palatable and nutritious product.

Sir William said that in the not-too-distant future food production would probably be mankind's major problem. It was estimated that in 50 years' time the present world population of 2,400 million might grow to 3,500 million.

"To provide food for this increased population at present levels of nutrition would involve an increase in agricultural production of about 50%, but in addition it is estimated that nearly two-thirds of the world's population is at present undernourished, and if this is to be remedied the total increase in food supplies necessary in 50 years' time will be something like 70%."

At the banquet held on Wednesday, July 13, the guest of honour was Earl De La Warr. He praised the work of scientists in contributing to the prosperity of the country and said that our only hope in the future was intensive development of our capacity for invention. Other speakers were Sir William Ogg and Sir Hugh Chance, chairman of the Birmingham and Midland section.

Quality control. On the following day the lecture on quality control in the food industry was given by C. A. Bassett of J. Lyons and Co. He said the aim was the preparation of a product that is not only pure, wholesome and in conformity with all legal requirements as regards its composition, but is also uniform and constant in all respects including composition, consistency, appearance and flavour. Mr. Bassett described a number of methods for testing the quality of foods, *e.g.* an accelerated keeping test for detecting the induction period of rancidity of fats. This test involves the placing of the fat sample in a flask with oxygen, heating and agitating and then checking the degree of oxygen absorption. A baking fat which showed an induction period of 11 hr., said the lecturer, would probably keep for six months. Very good quality fats have induction periods of up to 50 hr. and correspondingly good keeping qualities. Animal fats give sharper oxygen absorption curves than vegetable.

Turning to dough testing, Mr. Bassett mentioned the farinograph, and the extensograph. Gelatine was tested for moisture, ash and trace metals and also for strength in a gel tester. Discussing control of manufacture, he mentioned viscosity checks for custard, sauces, soups, etc., the testing of sugar fondant including the measurement of particle size, bacteriological examinations, the checking of chocolate for moisture, fats, sugar and particle size, and the general control of contamination by designing plant free from materials which would react with foods.

Custard powder. Among the factories visited was Alfred Bird and Sons Ltd. in Birmingham. This firm was established in 1837 and is now associated with General Foods of America. Visitors saw the manufacture of custard, blancmange and baking powder, jellies, and cake mixtures, and, in another factory, the manufacture of breakfast cereals, *Instant Postum*, and coffee. In the well-equipped laboratories, viscometers, jelly testers and alveographs were seen, together with such simple apparatus as the displacement test for measuring cake volume.

Bacon. Another old-established firm visited was Marsh and Baxter Ltd., at Brierley Hill. This firm was founded by Mr. Alfred Marsh in 1871. He was a pioneer and introduced the first mechanical refrigeration in this country in 1877. The factory is one of the oldest of the group and usually processes each week over 7,000 pigs, 200 to 300 cattle, and 500 to 600 sheep. Besides making bacon and the famous York hams, Marsh and Baxter produce pork and beef sausages, pork sausage flavoured with tomato, chipolata sausage, many types of cooked and pressed meats, pork pies, veal and ham and egg pies, steak and kidney pies, sausage rolls, etc. There is a curled hair factory adjacent to the main factory where the pig hair is processed for bedding and upholstery, etc., and to this has been added recently a plant for producing rubberised hair.

Other factories visited included Mitchells and Butlers brewery and the Midland Counties Dairy Ltd., both in Birmingham. The latter has one of the most modern ice-cream plants in the world which is capable of an output of a million portions a day. Technical developments of the company include HTST pasteurisation of ice-cream mix, the soft wrap briquette process which gives good hygienic safeguards as well as high productivity, rapid hardening methods and automatic filling of table bricks, cups, etc. Another visit of great interest to food chemists was to the Birmingham City Analyst's Department. Finally, there were visits to Ansell's Brewery, to Cadbury's and to the Birmingham Chemical Co. Ltd. The latter company, located in Lichfield, is a wholly-owned subsidiary of the Staveley Coal and Iron Co. Ltd., and specialises in natural and synthetic flavours. In the production of natural materials, high vacuum, continuous extraction and other special techniques are employed. The production of synthetic flavours follows the usual procedure for the manufacture of fine chemicals.

Imported egg restrictions

Frozen and dried whole egg imports from non-sterling areas are subject to new licensing arrangements, which have been made to expedite the disposal of government stocks of frozen whole egg.

Licences for one ton of frozen whole egg will be issued for every 15 tons bought from the stocks held by the Ministry of Agriculture, Fisheries and Food instead of four tons, as before.

The open individual licences for imports of dried whole egg from China and certain Eastern European countries will not be renewed for the rest of 1955. However, dried egg will be allowed to arrive from these countries in 1955 and the first half of 1956 to an amount which will maintain imports at least at the 1954 level.

"World Crops" entertains Australian farmers

A party of 31 Australian graziers and farmers recently arrived in England on the first stage of a world tour sponsored by the Australian Primary Producers' Union.

The tour will occupy 6½ months and includes a journey through England, Scotland, Wales and Ireland. The party will then proceed to the Continent and return to Australia *via* Canada, the U.S.A. and Honolulu.

On July 22 the party was entertained under the auspices of *World Crops*, a leading agricultural journal, at the Crux Easton, North Hampshire, estate of Mr. W. Leonard Hill, chairman of the Leonard Hill Technical Group. They were entertained at luncheon and shown the progress made in land reclamation and other developments on Mr. Hill's property. These developments include the modernisation of the dairy and other farm buildings which is now in progress.

Later the party went to Norton Farm, Sutton Scotney. Here Mr. R. P. Blackadder demonstrated the new "English" sectional storage silo.

The Queen visits jam factory

The Dundee factory of James Keiller and Son was visited recently by the Queen. She was received by Major W. C. Campbell, deputy chairman, Sir Frederick Wells, a director of the company and a former Lord Mayor of London, and Mr. C. J. Gahlinger, the factory manager. Mr. A. E. Pouncey, the chief chemist, and Mr. E. G. Turner, the chief engineer, were also presented.

Her Majesty and the Duke of Edinburgh saw the whole process of marmalade making. Keillers claim that they originated orange marmalade when, in 1797, Mrs. Janet Keiller boiled some of a shipload of bitter Seville oranges bought by her husband in the same way as she made quince preserve.

Food technology courses

Full-time courses available in the department of chemistry and food technology at the Borough Polytechnic are listed in a pamphlet published by the Department. These include—in addition to B.Sc. and Intermediate B.Sc. courses—courses leading to the Polytechnic diploma and higher diploma in chocolate and sugar confectionery and the higher national diploma in bakery.

Full information may be obtained on application to the department of chemistry and food technology, Borough Polytechnic, London, S.E.1. The new session begins on September 19, but intending students are expected to register as soon as possible.

The Queen and the Duke of Edinburgh share a joke with one of the employees who had prepared some samples of Keiller's products. On the left is Sir Frederick Wells, a director of the company.

Herring research station closed

The special research section of the Herring Industry Board at Port Glasgow Industrial Estate on the Firth of Clyde has been closed down. This station was established some years ago for research on the commercial packing and processing of herring. The failure of the Clyde herring fishing affected the plans for this work and in the latter period of its life the station was partly used for commercial production by an English firm, although the board maintained its interest. Now the decision has been reached to finally give up this venture, and to transfer the work done there to another research unit in Aberdeen.

In addition to this change the board will locate a laboratory at its Edinburgh headquarters where the scientific work previously done at Port Glasgow will be continued.

The Herring Industry Board has been trying to develop export markets for canned herring and will continue its efforts on that field under the new arrangement.

British Association meeting

Among the papers to be read at the annual meeting of the British Association for the Advancement of Science this year, the following will be of interest to food chemists:

"Nucleic acid structure and function" by Sir Alexander Todd.

"Some functions of nucleoproteins in micro-organisms."

"Some new separation techniques in chemistry."

"Plant breeding."

"Fertility in farm animals."

The meeting will be held in Bristol from August 31 to September 7.

Can sealing compounds

A reception was held in London recently to mark the 25th Anniversary of Dewey and Almy Ltd., London.

Mr. Graham MacLean, managing director, explained that it was in 1925 that E. W. Bliss (England) Ltd. were appointed Dewey and Almy distributors in the U.K. With the growing demand for can sealing compounds, Dewey and Almy Ltd., London, was formed in May, 1930. Mr. James Bunch, sales manager, stated that the London company today manufactures a complete range of container sealing products, including water-base can sealing compounds; water-base cap compounds; 100% solids compounds; drum and cover compounds; seam dopes and side seam cements; drawing lubricants; pre-fluxes and soldering fluxes, and supplies its own design of equipment to apply these products.

Support for bakery education

The National Board for Bakery Education announces that generous support has been forthcoming for the Joint Scholarship Scheme.

Apart from awards which will be made from the general funds of the National Association of Master Bakers and the National Board for Bakery Education, the following specific scholarships will also be awarded:

Allied Bakeries Ltd., Allinson Ltd., Baker Perkins Ltd., A. J. Clark, Thomas Hedley and Co. Ltd., Hovis Ltd., Institute of British Bakers Ltd., J. R. Irons Memorial Fund, Ladies' Section, National Association of Master Bakers, National Federation of Bakery Students' Societies, Procea Ltd., Joseph Rank Ltd., Southern Oil Co. Ltd., Spillers Ltd., United Yeast Co. Ltd.

COMPANY PROFITS AND PROSPECTS

John Thompson profits

The gross trading profits of the John Thompson Ltd. group were £2,049,591, which is an increase of £576,831 over the previous year. The net profits for the year after paying £954,464 in tax and £250,052 for depreciation and special depreciation reserve amount to £777,586 (£413,168).

*

New brewery planned

Plans for building a modern brewery at their Trueman Street, Liverpool, site were announced by the chairman of Threlfall's Brewery Co. Ltd. at the annual meeting. Before building can start, it is necessary to provide additional space by building a new transport depot to house the existing fleet of motor vehicles. The depot will be adjacent to the present mineral water factory. Plans have also been made for the erection of new head offices and new bonded premises, the latter to replace part of the existing Bond.

At their Salford brewery the bottling stores are being extended and in the near future the brewery boiler house will be equipped with a complete modern oil-firing installation, partly due to the age of the existing boilers and partly to comply with new smoke abatement regulations.

Net profit for the year is £366,991.

*

Rowntree's exceptional year

Last year's record trading results should be regarded as exceptional, warned Mr. W. Wallace, chairman of Rowntree and Co. Ltd. at the 58th A.G.M. Sales reached £43 million last year and the group's net profit before tax was £3,831,460 (£3,057,553), an increase of £773,907. The de-rationing of chocolate and confectionery followed by the freeing of sugar in 1953 naturally accounted for increased sales. Now, however, productive capacity exceeds demand, and competition is growing. The pre-war seasonal fluctuations in demand have returned, and cocoa prices are still unstable.

A 25-acre site has been bought for a new branch factory at Fawdon, near Newcastle-upon-Tyne. The factory will cost about £1¼ million and will employ about 800 people. It is expected to be in part production by next year.

*

Biscuit firms' "unprecedented" boom

Mr. Phillip Carr, chairman of Associated Biscuit Manufacturers Ltd., reported that the combined output and sales of the two big subsidiaries, Huntley and Palmers Ltd. and Peek Frean and Co. Ltd., have reached unprecedented figures, through the removal of controls, by the re-equipment and expansion of their factories and by the large home demand.

Group profit for 1954, after deductions, is £953,210 (£527,352).

Although the construction of the Huntley and Palmers factory at Huyton, near Liverpool, is not yet finished, production has started and it is hoped that before long it will be fully operating. In five years the group has spent £3 million on buildings and plant.

*

Competition in canning

Trading results for all companies except one in the H.P. Sauce Ltd. group were very satisfactory, said Mr. John T. Lewis, the chairman, at the annual meeting. The exception was Norfolk Canneries Ltd., which incurred a loss owing to stiff competition in the canning industry. Both H.P. Sauce Ltd. and Lea and Perrins Ltd. showed good results and the American company, Lea and Perrins Inc., has also shown higher sales and profits and has benefited from reduced tax.

Net profit of the group for the year after deducting tax and the share attributable to outside interests is £364,354 (£312,098).

*

Beechams earn more

The consolidated profits for the Beecham Group Ltd. include profits for three months in respect of H. W. Carter and Co. Ltd., which was acquired during the year. The consolidated trading profit for the year ended March 31, 1955, rose from £3,133,107 in the previous year to £3,823,494. A final dividend of 10% was recommended, making a total Ordinary dividend of 30% less tax. The shares issued toward the end of the year in connection with the acquisition of H. W. Carter and Co. rank for the final dividend only.

Erections and Extensions

Burton, Son and Sanders, Ltd., bakers' sundries manufacturers, sugar and almond millers, have opened a London factory and distribution depot at Staffordshire Street, Peckham, London, S.E.15.

*

Plans have been drawn up by **Scottish Co-operative Wholesale Society, Ltd.**, to construct a five-storey tea factory in Shieldhall Road, Glasgow, S.W.1.

*

Belfast Food Products, Ltd., Castlereagh Road, Belfast, N. Ireland, will shortly erect a new pig slaughterhouse adjoining their factory.

*

The Metal Box Company Ltd. are to lease the greater part of a new building to be erected on the west side of Baker Street at its junction with Blandford Street. The new building is due to be completed by December 1956. It will be used as head offices for the company and will include a display of their products and the showroom of the Canned Foods Advisory Bureau.

A storage and washing depot (100 ft. by 62 ft.) is to be erected soon for **Milk Vessels Recovery, Ltd.**, on a site at Brandling Park, Felling, Co. Durham.

*

D.F.Y. Co., Ltd., confectionery manufacturers, are planning to erect a two-storey extension to their factory at 190, Rickmansworth Road, Watford, Herts.

*

Thomas and Evans, Ltd., are having extensions erected at their mineral water depot in Evesham Road, Stratford-on-Avon, Warwickshire.

*

Severn Valley Meat Products, Ltd., are planning to erect an extension to their factory in Grosvenor Place South, Cheltenham, Glos.

*

Extension of their factory is shortly to be carried out by **Lakeland Food Industries,** Maryport, Cumberland.

*

Cadbury Bros., Ltd., have had plans approved for the construction of a new depot in William Street, Felling, Co. Durham.

William Macdonald and Sons (Biscuits) Ltd., Hillington Estate, Glasgow, are to build a new factory at Cardonald, adjoining the Hillington Estate. Some 750 workers will be needed at peak, some three years hence. Macdonald now have 1,000 workers in an 89,000 sq. ft. factory at Hillington, making chocolate-covered lines and biscuits for national distribution.

*

The ice-cream factory of **T. Wall and Sons (Ice Cream), Ltd.**, at The Friary, Acton, is being rebuilt. The west wing of the factory is being extended on the site of an old cold store, demolished in 1951, and will have three storeys. The ground floor will provide extra space for brickette production and the first floor will be for choc-bars. The top floor is being equipped as a laboratory for research and development work on all Wall's products, as well as for routine analysis and checking. There will be large bacteriological, analytical and physical laboratories and a pilot plant for experimental production. Work should be finished early next year.

APPOINTMENTS AND RETIREMENTS

A Dutch-born canning expert, 51-years-old Mr. Huibert Kraayeveld, has been appointed controller of the Smedley canning factories in Kent and a director of British Fruit Ltd., one of the Smedley group of companies of which Mr. Wallace Smedley is chairman. Mr. Kraayeveld came to England in 1937 to manage a branch of Zwanenberg Ltd., Dutch meat canners. He had been with the firm all his working life, beginning as an office clerk and rising to a director. In 1952—after more than 30 years with the company—he left to join Allied Canners (Boothtown) Ltd., where he stayed until his Smedley appointment. His new appointment brings with it responsibility for co-ordinating Smedley's production activities in Southern England.

•

The Royal Sanitary Institute announces the election of Dr. A. Parker, C.B.E., director of the Fuel Research Station, as the new chairman of its council. He assumes the office on October 1, when he will succeed Mr. J. C. Morris, B.SC., A.M.I.C.E., the present holder of that office.

•

Mr. James Michie, 68-year-old manager of the bakery department of James Keiller and Son, Ltd., Dundee, was awarded the M.B.E. in the Birthday Honours List. The honour was conferred for his long service with the firm and particularly for his part in building up dollar earnings by the increase of their cakes and shortbread export business.

•

Mr. P. J. A. Turner, A.M.I.E.E., has been appointed a director of Kelvin and Hughes (Industrial) Ltd. He will continue in his duties as chief engineer at the company's Hillington, Glasgow, factory.

•

The National Association of British and Irish Millers has appointed Mrs. Patty Fisher, B.SC., M.R.SAN.I., as senior dietician lecturer. Her department will organise talks, demonstrations, and lectures and articles on nutrition, catering, and cooking—with special reference to the use of flour, bread and flour products in the diet.

•

Mr. L. G. Fisher, C.M.G., director of the oils and fats division in the Ministry of Agriculture, Fisheries and Food, retired on June 30. Mr. E. C. U. Wilson, assistant secretary, is now responsible for the remaining work of the oils and fats division.

•

Mr. Frank E. Keevil resigned his office of chairman of Peter Keevil and George Walker, provision merchants, on July 6. Mr. Thomas Dixon Grant Munro, C.A., was appointed a director of the company on July 6 and became chairman from that date.

Mr. H. Kraayeveld

The Australian Wine Board has appointed Mr. H. F. M. Palmer, of Adelaide, as secretary of the Board. Mr. Palmer, who is 39, was previously assistant inspector of excise in South Australia. He is well known in the wine trade in Australia. He succeeds Mr. George Martin, who was with the Board for over 20 years.

Obituary

Mr. Osman Jones, of St. John's Laboratory, and scientific adviser to the Lovell and Christmas Limited Organisation for many years, died on June 22 after a very brief illness, aged 69. He had many friends in both scientific and food trade circles, and in matters relating to food manufacture and preservation his opinion was greatly respected.

Fourth Food Fair

Bookings are being accepted for the fourth British Food Fair to be held at Olympia from August 28 to September 15, 1956.

It will be bigger than the last fair and will last for seventeen working days. The 1954 fair became too crowded for the comfort of either the exhibitors or the public.

The fair is promoted by the Food Manufacturers' Federation Inc. under the publicity sponsorship of the *Daily Express*.

Correction

In the article "Improving Cacao Butter by Hydrogenation or Isomerisation," by Dr. A. A. Newman, in the July issue, the illustrations corresponding to Graph II (p. 287) and Graph III (p. 288) should be interchanged. On p. 289 Graph II should read "Graph III."

DEATH OF SIR HAROLD TEMPANY

It is with the deepest regret that we record the death on July 2 of Sir Harold Tempany, C.M.G., C.B.E., F.R.I.C., the distinguished agricultural scientist who, until March of this year, was Editor of our associate journal *World Crops*. He was 73.

Sir Harold had long experience of agriculture in the British Colonies. His first post abroad was in the Leeward Islands in 1903 as an assistant agricultural chemist. He was later appointed Superintendent of Agriculture there. In 1917 he became Director of Agriculture in Mauritius and became the first Principal of the Mauritius College of Agriculture. From 1929 to 1936 he was Director of Agriculture in the Straits Settlements and Federated Malay States and was a member of the Federal Council. He returned to London in 1936 as the assistant to the Agricultural Adviser to the Secretary of State for the Colonies. Four years later he succeeded Sir Frank Stockdale as Agricultural Adviser. He retired from the service in 1946 and was knighted in that year.

It was in 1949 that he became associated with Leonard Hill Limited, undertaking the Editorship of *World Crops* which Mr. Leonard Hill founded in that year. Under his guidance, *World Crops* rapidly became a foremost authority on world agricultural problems, achieving an international circulation.

Our deepest sympathies are extended to Lady Tempany and to her daughter-in-law, Mrs. Timothy Tempany, whose husband, Sir Harold's only child, died in Nairobi only 36 hours before his father's death.

Canning inventor to visit London

Mr. Horace L. Smith, co-author of the Smith-Ball canning process which was described in our April issue, is to visit London in September. He will be available to discuss the process with British food manufacturers.

New address

Rhoden Partners Ltd., designers of plant and machinery, have moved to larger premises at 51, North Row, London, W.1 (Tel. MAYfair 6248).

At their new premises they will be able to expand their drawing offices and to provide additional services. Site surveys can now be carried out and installation drawings prepared.

Cheese quota established

A quota has been established for the import, under specific individual licence, of natural cheeses from Canada and the U.S.A. The Board of Trade have fixed the quota for the 12 months ending June 30, 1956. Full details are given in Notice to Importers No. 737.

Lard for Britain

Britain is to receive about 1,631 tons of lard worth $500,000 (£180,000) from the U.S. Foreign Operations Administration.

The F.O.A. has issued a procurement authorisation for the lard, for which Britain will pay in sterling.

R.S.I. museum closed

The Royal Sanitary Institute announces that during the period of the reconstruction and modernisation of the Institute's Museum of Health the Museum will be closed to students and members of the public as from August 1, 1955. It is expected to reopen in the spring.

Can makers visit canners

Employees of the Metal Box Co., Ltd., Sutton-in-Ashfield, have paid a series of visits to the Sheffield food canning plant of Batchelors Peas Ltd. to see for themselves how the cans they make are used.

The visitors were shown over the factory by girls specially trained as guides, who work on the production lines and are thus able to explain from first-hand experience the different processes and operations in canning food.

Jelly standards amended

An alternative to the present standard for table jelly crystals of a minimum of 84% sugar content is prescribed by Orders amending the Food Standards (Table Jellies) Order, 1949. The alternative standard, which enables low setting gelatine to be used in the manufacture of table jelly crystals, requires that when table jelly crystals are made up each pint of the finished product shall contain not less than 2½ oz. of sugar.

Gelatine of low setting power conforms to the Edible Gelatine Standards Order. It is suitable for the preparation of table jelly crystals, but for technical reasons more has to be used and the requirement of a minimum of 84% sugar content would, if low setting gelatine were used, result in an excessively sweet jelly. The prescription of a minimum weight of sugar in the finished product avoids this difficulty.

The new Orders are the Food Standards (Table Jellies) (Amendment) Order, 1955, and the Food Standards (Table Jellies) (Scotland) Amendment Order, 1955.

OBITER DICTA

● Mrs. Anne Snoyer won an uncontested divorce after testifying that her husband habitually ate raw onions in bed.—*Time.*

● This year's annual award of "Man in the Biggest Pickle" goes to Georgi Malenkov.—*National Pickle Packers' Association in America.*

● The stomach knows no nationality. A little of what you fancy does you good.—*W. A. Steward, M.P., defending Australian wines against "wine snobs."*

● We have heard in history of a surfeit of lampreys and likewise of peaches and new ale, but a surfeit of sausages! There cannot be such a thing.—*The Times.*

● I am shocked that you print a letter saying the best way to send a bottle through the post is to "wrap it" in a loaf. A wicked waste of food!—*Letter to Daily Express.*

● "Choctails" — glasses of drinking chocolate — are a new fad in the West End. I have seen "choctail" bars at many of this year's deb dances.—*Sunday Express.*

● Three thousand whales equal forty-five thousand tons of oil for margarine; or some hundreds of millions of pounds spread thickly over the whole population.—*B.B.C. programme "Expedition South."*

● One day, when in Caerphilly, I bought a Caerphilly cheese at a local shop. On arriving home and unwrapping the cheese, I found stamped on the bottom of the cheese, "Made in Denmark."—*Manchester Guardian.*

● How many people have seriously thought that cream puffs invariably contained real cream—or cared for that matter. One might as well assume that father cuts himself shaving because the cream he uses is not up to full dairy standard.—*Bristol Evening Post.*

● The sons and daughters of bulls and cows grazing today might be born 100 years hence if the possibilities of artificial insemination can be exploited to the full. By freezing it may be possible to preserve semen, ovarian tissue, ova or fertilised eggs for a century.—*Speaker at Farmers' Club.*

Ministries share food hygiene responsibilities

General food hygiene in England and Wales is now the responsibility of the Ministry of Health under the Transfer of Functions (Food and Drugs) Order, 1955, issued recently. The hygiene of milk production and distribution, of meat and meat products and the composition and labelling of food remain under the Ministry of Agriculture, Fisheries and Food. The Ministry of Health is still the central department responsible for medical advice on all food matters and for the control of milk-borne disease.

U-V sterilisation in factory canteen

Food that has been passed through air sterilised by ultra-violet rays will in future be served to the 5,500 employees of F. Perkins Ltd., the Peterborough diesel engine firm. The company is believed to be the first to install ultra-violet lighting as a preventative against germs and disease in its industrial canteen.

Deep frozen poultry portions

The Airdrie Egg and Poultry Packing Station has laid down a 50 ft. by 50 ft. extension to their premises to house a new plucking, packing and freezing section.

Selected birds are cut into portions, packed in printed polythene bags and deep frozen. Labels indicate how many persons each portion is suitable for, and the normal policy is to pack wings as one portion, to pack one drumstick from leg to hip joint as a portion and to halve the breast.

Imports of rice, bananas and bees

Rice, citric acid, bananas and bees may now be imported without separate licences, states the Board of Trade.

The new arrangements apply to rice grits, ground rice and citric acid from countries outside the dollar area, and to bananas from Western European countries and their dependencies. Bees may be imported from all countries but are subject to the Importation of Bees Order, 1955.

Sugar dearer

The basic selling price of raw sugar has been increased by 4s. 3d. cwt. by the Minister of Agriculture, Fisheries and Food.

The increase entitles refiners, under their agreement with the Minister, to raise the price of granulated sugar by a corresponding amount, but retail prices should not rise by more than ¼d. per lb.

The increase is said to be necessary to avoid a continuing subsidy on sugar.

Food News Overseas

Italian food show

The exclusive right to display food processing machinery in Italy is said to have been granted to the organisers of the Parma Fair, which is to be held during September 20-30. The fair will include the "International Exhibit of Processed Food and Packaging" and the "International Salon of Food Equipment." It is claimed that the fair is the only regular trade show in Europe to display all aspects of the food industry, including raw materials, machinery, finished products and packaging devices.

Canned foods survive atomic blast

Canned and glass-packed foods tested during the atomic explosions at Nevada recently, seemed to suffer less physical damage than some of the structures in which they were stored, according to observers.

Observers were not allowed nearer than 4,700 ft. from the centre of the explosion. They reported that at this distance food in intact packs was "probably acceptable" for use and substantially free of radioactivity. Packages usually failed by being dislodged from cupboards or by being hit by missiles: there was no bursting by blast overpressures.

A nine-man taste panel decided that the atomic bomb had not appreciably changed the flavour and colour of frozen foods stored in a 17½ ft. home freezer, in the kitchen of a concrete house, 4,700 ft. from the explosion centre.

South African fish research

Following a survey of the existing arrangements for the rail transport of fish in South Africa, a refrigerated rail truck is to be lent to the Fishing Industry Research Institute by the recently formed Hake Research Committee collaborating with the railways administration. Comparisons between the estimated costs of icing and transporting fresh hake from Cape Town to inland markets and those of rapid freezing and transporting fish, initially frozen but thawing *en route* in refrigerated and insulated trucks, indicated that the latter is more economical. The Institute hopes to overcome the current prejudice against frozen fish.

Investigations on the use of antioxidants in frying oils are reported. Octyl gallate and nor-dihydroguairetic acid are the most effective so far.

Research on the complex problem of pinking organisms in salt continues. Since many different types of red halophiles occur in South African solar salts no two strains behave in the same way, and completely contrasting pigments are obtained from different organisms. These differences seem to be related to the number of bacteria initially present in the salt and a method for the quantitative enumeration of the initial load of red halophiles is being devised, so as to establish minimum bacterial standards for fish-curing salts. Although it may prove possible to roughly predict the "market life" of a dry salted fish, the Institute recommends the use of treated grades of salt. It is pointed out, however, that traces of previous stocks of salts may contaminate the treated grades and thorough disinfection with fresh water, preferably slightly acid and heated to 85-100°C., is advised.

The recommendations of the Foods Standards Committee of the British Ministry of Food on trace elements in marine products are also quoted.

Potato puffs

A potato puff, fat free because it is made without frying and shaped like a pillow, has been developed by the Western Regional Research Laboratory of the U.S. Dept. of Agriculture. The basic process is simple: peeled potato strips are blanched in boiling water, flavoured with cheese, salt or onion and then are dried very rapidly. Steam generated inside the strip blows up the puff, which becomes crisp throughout.

The Eastern Regional Research Laboratory has produced a potato flake which is claimed to yield a more palatable mashed potato when boiling water or milk is added. The process uses a double rotating steam-heated drum in which the previously mashed potato is dried and extruded in sheets of controlled thickness. A new type of drying drum is also the primary innovation for the Western Research Laboratory's recommendations for producing improved potato granules. Hot air passes upward through a perforated plate which holds the granules so that cells are not ruptured (the reason why re-hydrated potato is pasty), and as they are continually moving drying is rapid and complete. It is claimed that this drum will treat about 1,000 lb. of potatoes per hr., giving a residual moisture content of 3% as compared with the common average of about 7%.

Can labellers for Yugoslavia

An order for nine Model C.10 *New Way* can labelling machines has been placed by the Yugoslavia Purchasing Commission from the Purdy Machinery Co. Ltd. The commission has been in this country for some months past buying various items of equipment for a number of abattoirs in Yugoslavia.

Short weight protest?

A mystery bomb explosion destroyed a weighbridge at the Invicta Sugar Mill, Giru, Queensland. The weighbridge had been the subject of frequent complaints by local farmers who said that it short-weighted their sugarcane.

The police are said to be meeting a "wall of silence" in their enquiries among the 200 cane farmers, who are mainly of Italian descent.

New process for Australian raisins

A new revolving cooling-drum for raisins has been used for the first time in Australia this year. After they have been softened for seeding, the raisins are placed in the drum, which dries and separates them.

The drum has been used to process raisins packed in 28-lb. packs instead of the previous packs of 56 lb. The smaller packs are said to be easier to handle, to arrive in England in better condition and to be free-running, as they are now subjected to less pressure within the box.

Improvements for Irish flour

Inferior flour was blamed for reduced bread consumption in the Irish Republic by Mr. H. E. O'Donohoe, of Bollands Ltd., millers and bakers. Mr. O'Donohoe said that the Government had intimated some time ago that the erection of suitable drying and storage accommodation was desirable for handling the native wheat crop and the company had formed a subsidiary to meet this position. Drying plant had now been delivered and as work had begun on the building a year ago it should be ready very shortly. The silo would be suitable for storing 7,000 tons of grain, with a drying capacity of 18 tons per hr. It will have a heat intake sufficient to accommodate the simultaneous discharge of four vehicles, and automatic conveyors will carry the grain to the bins immediately after unloading. A provender plant for balanced animal rations has also been installed.

Cocoa and coffee from New Guinea

Coffee and cocoa growing are developing in the Australian territory of New Guinea, according to Queensland's Under-Secretary for Agriculture, on his return from a tour of Papua and New Guinea. The productive capacity of the soil is high and the development of coffee and cocoa will not compete with Australian crops.

Australia produces practically no cocoa and in 1951-52 imported more than £A4,500,000 worth. It also grows very little coffee and in the same year imported £A1,250,000.

Butter challenge cup winners

The A.P.V. challenge cup awarded at the Waikato winter show, New Zealand, for that country's best export butter has been won by the Shannon Dairy Co., Shannon, North Island, N.Z., with the Rangtiki and Bay of Plenty Dairy Companies as runners-up. The butter was judged in London by the Inspectors of the New Zealand Department of Agriculture.

Hungary exports food plant

Several ice factories and plant oil mills in Turkey are reported to have been built by the Hungarian Food Industry Planning Institute. The Institute has provided the plans for three canning plants in Albania, a plant oil extraction factory in Indonesia and a condensed milk factory in Bulgaria. Tenders for sugar factories have been sent recently to China, Chile and Rumania, and for a cold storage plant to Turkey. Poland has asked for plans for a tomato factory and Egypt for silos.

Beef dehydration research

Reprints of six articles on various aspects of the freeze-drying of meat, prepared by members of the American Meat Institute Foundation and published in technical journals, are now available in limited numbers from H. R. Kraybill, vice-president and director of research of the Foundation.

The studies were announced by the Foundation a year ago when it was stated that enough information had been collected over a period of years to allow commercial development of dehydrated beef cubes or slices. The commercial processes visualised would include removal of 70-80% of the moisture in the meat by freeze-drying, followed by the application of heat to complete the drying process. According to the Foundation, fresh beef dehydrated in this manner will soak back on immersion in water to an essentially normal condition and can be cooked and served as usual. Pilot scale experiments by other laboratories have confirmed the Foundation's findings.

Good prospects for jams in Ceylon

Prospects for the sale of jams, fruit jellies, marmalades and table jellies in Ceylon are considered good, reports the Board of Trade.

The demand for jams and marmalades has been met in the past mainly by tinned jams from Australia, but British firms are now taking an increasing share of the market for tinned jams and also satisfy most of the steady, if limited, demand for jams in glass jars. In 1951 93% by weight of the market came from Australia, but in 1954 the percentage was 77. The British share increased from 6% in 1951 to 16·6% in 1954. There is very little local production of jams and marmalades.

The current demand for table jellies is almost entirely met by United Kingdom supplies and there is no reason to expect any greater demand. Jelly crystals are preferred to the tablet form.

There is no restriction on the importation into Ceylon from this country of jams, fruit jellies and marmalades or of table jellies. There is a Food and Drug Act, 1949, in Ceylon which was modelled on parallel legislation in this country and is essentially the same.

Mexico's new rum distillery

Bacardi's new rum distillery at La Galarza, Puebla, Mexico, will be completed by the end of the year, according to Juan C. Grau, chief chemist of the company. The distillery, with a design capacity of 20,000 litres per day, has been under construction since February at a site 120 miles south-east of Mexico City on the Pan American highway.

All five of the 50,000-gal. fermentation vats, installed in an area 80 by 80 ft., will be Heresite-lined. This area, said Mr. Grau, is covered by a dome-shaped roof mounted on four concrete columns. The second floor (working level) has concrete walls, but the first floor is open to permit free circulation of cooling air around the vats. Flooring on the second level is made of iron grating welded to the sides of the metal vats, and the windows are Solex glass. Water and molasses will be mixed in the fermentation vats to avoid contamination that might occur if dilute molasses were pumped through lines leading to the fermentation units. All of the horizontal tanks used for pre-fermentation are glass-lined.

The distillation room is also a four-storey unwalled concrete building. The working decks, 50-ft. diameter circles, are supported by six concrete pillars placed in the shape of a hexagon. The taller distillation columns project through a square opening located eccentric with the floor area, to provide maximum working space where it is needed.

BOOKLETS RECEIVED

★A brochure "Sell it in a tube" is the latest publication of the Collapsible Tube Manufacturers' Association, and explains a specialised application of these flexible metal containers. Its object is to tell food manufacturers of the advantages of collapsible tubes (already widely used for this purpose on the Continent) as packs for all classes of foods produced in paste, cream, jelly, or semi-liquid form. The booklet is available free from the Association.

▪

★Semtex Ltd. have produced a leaflet describing the corrosion-resistant properties of their resin and latex cements. They point out that in food preparation, hygiene demands particular attention to the dangers of corrosive action and invite companies to send for trial packages of Semtex/resin cement and latex cement.

▪

★A recent issue (No. 29) of *The Aluminium Courier*, published by the Aluminium Development Association, is devoted to "Aluminium in the drinks industry." A group of cylindrical storage vats at Guinness' Dublin brewery is illustrated on the front cover, and the rest of the periodical describes many applications of aluminium from 200-barrel capacity fermenting tuns to foil bottle caps.

▪

★The hygienic value of nylon in the food industry is emphasised in "Nylon goes to work," a booklet produced by British Nylon Spinners Ltd. It is claimed that as nylon fabrics are immune to insect and bacteria attack, they are particularly suitable for sifting cereals, cocoa, dried soups, yeast, malt and dried milk. Nylon is also used for flour chutes, dough provers, seed crushing cloths and forcing bags.

▪

★Potassium iodide mixtures for domestic salt, mineral supplements for animals and veterinary medicines are described in a booklet produced by May and Baker Ltd. to introduce their *Embamix* preparations. Iodine and its function in the body are discussed and a description given of the *Embamix* mixtures. The iodising of free-running and coarse crystalline salt by various processes is described.

▪

★Steam-jacketed pumps suitable for chocolate, cheese, honey, dough, etc., proportioning and other rotary pumps are described in a new leaflet issued by Plenty and Son Ltd. A diagram is included showing their *Universal* pump and a chocolate pump is shown, installed at George Payne Ltd. (makers of *Poppetts*).

Food Packaging

Laminated soup pockets

Soup pockets have been produced by the Metal Box Co. Ltd. for Leibig's Rhodesian company. The pockets are filled in Southern Rhodesia and distributed throughout Central and South Africa. Metal Box have made the pockets from *Tripolam Grade X-1*, a three-ply metallic laminate specially devised for protecting soup concentrates. They are printed in three colours by photogravure, the colour of the oval panel changing for each variety of soup.

Future of aluminium foil

Condensed milk, coffee concentrate, icing and jams, will eventually be packed in aluminium foil collapsible tubes, according to Mr. J. A. Ambler, of the Northern Aluminium Company. He was opening a recent meeting to discuss the use of aluminium in packaging during the Centenary Exhibition sponsored by the Aluminium Development Association.

With regard to wrapping butter, a British Standard—"Vegetable Parchment — aluminium foil laminate (Parchfoil)"—is being prepared. It is estimated that some 1,000 tons of 0·008 mm. foil would be needed to wrap all the butter and margarine sold in Great Britain.

The most important topic of the discussion following Mr. Ambler's paper was the use of aluminium foil packs for dairy and other food products. Mr. Hartland-Swann, of Venesta Ltd., who has just returned from a packaging survey in the U.S., pointed out the eye-catching properties of foil in self-service shops. He also emphasised its impermeability to air, moisture and oil, that it is a light barrier and that it does not support bacteria. Speaking on aluminium tubes, he said that, as an experiment, Venesta have already packed cheese in tubes.

Return to cartons

Cartons have been re-introduced by Samuel Hanson and Son Ltd. for marketing their dried fruit.

The dried fruit is divided into three kinds—mixed fruit, sultanas, cleaned currants—the category boldly appearing in the centre of the front and back panels. The design, printed in red, blue, black and gold, was prepared by Boxfoldia studio and was based on existing labels, so that a family tie-up could be kept throughout the whole of the company's products. The side panels on the carton have been used to give details of other products made by Samuel Hanson.

To prevent the gold bronze coming into contact with the product, and to keep the "fresh" appearance of the pack during handling, the carton has been spirit-varnished on the outside. Inside the carton a waxed surface has been used—this forming a barrier for protecting the product and the pack.

Bolsters for lobsters

Polythene bags containing ice are being used as "bolsters" for packaging lobsters and other shellfish by Fisher Bros. of Billingsgate.

The method is said to overcome the danger and inconvenience resulting from the use of free ice in the containers. The flavour of the fish can be spoiled by coming into contact with fresh water from melting ice, and the waterproof film now used is a better solution than the absorbent sawdust formerly used.

Using polythene ice bolsters to pack lobsters in cardboard cartons.

The film, supplied in the form of lay-flat tube, is cut to the required length, heat-sealed at one end, filled with water and then completely heat-sealed. The bags of water are placed in refrigerators and frozen. When consignments are being packed for export, lobsters and crabs are placed on a layer of "ice-bags" and padded with wood wool. When the ice melts, the water remains sealed in the bags. An added advantage is that extra "life" is given to the cardboard cartons. Formerly, damp conditions inside reduced their handling strength, and air companies, in particular, were reluctant to handle them.

Vacuum-formed polythene

A new kind of food package, claimed to be completely transparent, hermetically sealed, economical, semi-flexible and yet rigid enough to be stacked without crushing, has appeared in Canada. It apparently marks the first use of vacuum-formed polythene sheet in food packaging.

Modern Packaging states that the new package has been introduced by Crescent Cheese Co., Montreal, for its *Kurds* creamed cottage cheese.

The package consists principally of a 1⅛ in. deep base that is vacuum-formed from a sheet of light-gauge polythene to give a rectangular depression. A lip of polythene is left on all four sides around this depression. To make the finished package a sheet of polythene-coated *Cellophane* is heat-sealed to the lip.

New range of soup pockets made of three-ply metallic laminate.

New Companies

Frank Harvey (Confectioners), Ltd. Hill Top Bakery, Priory Row, Coventry. Bakers, confectioners, caterers, etc. £3,500. Dirs.: F. V., A. A., Mrs. M. A. and Mrs. W. A. Harvey, Mrs. D. M. White and C. Griffin.

H. R. Williams (Leicester), Ltd. 28, Spinney Hill Road, Leicester. Manufacturers of and dealers in sausages, cooked and potted meats, etc. £500. Dirs.: H. R. Williams and H. W. Godwin.

Gray Bros. (Soft Drinks), Ltd. North Road, Middlesbrough. To take over business carried on as "Gray Brothers" at Middlesbrough. Mineral water, soft drink and aerated water manufacturers and distributors. £10,000. Dirs.: G. and J. W. Gray.

Johnson and Martin, Ltd. 20, Lulworth Avenue, Wembley, Mdx. General manufacturers' agents, manufacturers of and dealers in food, drinks, sweets, grain, cereals, fruits and vegetables, etc. £100. Dirs.: F. O. Johnson and L. Martin.

Digestomints, Ltd. 37, Devonshire Lane, Leeds. Manufacturers of and dealers in medicated peppermint tablets, etc. £100. Dirs.: F. Kingham and Mrs. M. Kingham.

Malkins' Bakeries, Ltd. 36, Tramway Street, Leeds, 7. £5,000. Dirs.: E., I., E., W. and Sarah Malkin.

Maronex, Ltd. (547201.) General and manufacturers' agents, producers, mnfrs of and dlrs. in canned goods, etc. £100. Dirs. to be apptd. by subs. Subs.: Jean Herbert (co. dir.) and Claire Moore (secy.), 156, Strand, London, W.C.2.

Frank Holgate and Son, Ltd. (547248.) 8-10, Holme Lane, Sheffield, 6. Importers and buyers and sellers of and mchts. of meat, butchers, etc. £1,000. Dirs.: J. B., Mrs. H. and F. Holgate.

H. Lee and Sons (Minerals), Ltd. (547251.) 89, High Street, Berkhamsted, Herts. To acquire from Harvey H. Lee and Fredk. W. Lee the goodwill of the business of mineral water mnfrs. cd. on at Berkhamsted as "H. Lee and Sons." £10,000. Joint dirs.: H. H. Lee and F. W. Lee.

Nesso Comestibles, Ltd. (547257.) Makers of and dlrs. in sausages, brawns, etc. £1,000. Dirs: to be appted. by subs. Subs.: W. L. Foster, Hatherlow, Raglan Road, Reigate, Surrey, and Susan Links.

Allenia, Ltd. (547315.) General and mnfrs.' agents, producers, mnfrs. of and dlrs. in canned goods, etc. £100. Dirs.: to be apptd. by subs. Subs.: Jean Herbert (co. dir.) and Claire Moore (secy.), 156, Strand, London, W.C.2.

C. Morris (Xmas Food Hampers), Ltd. (547316.) 73, Sheil Road, Liverpool, 6. Mnfrs. and dlrs. in sweets, chocolates, biscuits, cakes and confectionery of all kinds. £100. Dirs.: C. Morris and Ruth Morris.

Bargate Oil and Dripping Co., Ltd. (547405.) Forresters Hall, Garibaldi Street, Grimsby. Manufacturers of and dealers in edible oils, fats, etc. £10,000. Dir.: H. Rosenberg.

Cherryfield Brand Meats (Brighton), Ltd. (548943.) 44-6, Cherry Orchard Road, Croydon, Surrey. £99. Dirs.: T. P. and W. J. Coughlan and R. H. Saunders.

From Jordan and Sons Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.

The Leonard Hill Technical Group this month

World Crops.—Spraying Techniques and Machinery in the Sudan Gezira; The Use of Sprinkler Irrigation Systems in Central and South America; Irrigation by the Spray-Line System; Russian Comfrey—Food for Thought; Yugoslav Agriculture's Ten-Year Plan.

Dairy Engineering. — Flavoured Milk; Manufacture and Characteristics of Milk Flavours; Full-Flavour Orange Drink Production; Is Flavoured Milk a True Product?; The Manufacture of Milk Chocolate Crumb; Is it an Orange Bubble?; The True Flavour of Milk; Dairy Development in Cyprus, 1.

Manufacturing Chemist. — Tablet Making; Hydroponics; Progress Reports; Pest Control Chemicals, Perfumery and Essential Oils.

Corrosion Technology. — The Dezincification of Brasses in Marine Environments; The Effect of Temperature Treatments on the Corrosion Resistance of Hardened 13% Chromium Steels; Corrosion of Metal Containers; Dutch Research Organisation Installs Climatic Test Chambers.

Fibres.—Industrial Uses of Artificial Fibres, 2; Second International Textile Exhibition at Brussels; 40th Annual Conference of the Textile Institute; Practice and Progress; The Drying and Heat Treating of Textiles Containing Cellulose Fibres; Arnel Triacetate Fibre.

Chemical and Process Engineering. — Industrial Scale Possibilities of Chromatography; Chemical Engineering Review: Fractional Distillation; PTF (Polytetrafluorethylene) in the Chemical and Allied Industries; Chemical Engineering Problems of the Iron and Steel Industries, 2; Petroleum Chemicals Expansion at Grangemouth.

Petroleum.—Geophysical Methods of Oil Prospecting, 5; Petroleum Chemical Processes, 2; Industrial Hygiene in the Handling of Aliphatic Petroleum Chemical Monomers.

Trade Marks

APPLICATIONS

ALMAC. — 735,297. Macaroon paste. **Allmey and Layfield, Ltd.,** 1-29, Holden Street, Liverpool; Manufacturers.

AMIGA. — 738,015; and **CANDITA.** — 738,016. Flavoured milk beverages. **Robert Schlor-Burger,** Reinach, Aargau, Switzerland; Manufacturer and merchant.

BLACKGEMS.—736,993. Dried fruit. **R. Atcherley and Co., Ltd.,** 21, Victoria Street, Liverpool, 1; Merchants.

BLACK STARS.—736,994. Dried fruit. **R. Atcherley and Co., Ltd.,** 21, Victoria Street, Liverpool, 1; Merchants.

BOREALIS SHRIMPS.—732,080. Canned shrimps in brine. **Paul Albeck,** 22, Donovan Avenue, London, N.10; Wholesale provision merchant.

CETAGAR. — 738,733. Vinegar and sauces and preparations of acetic acid and caramel for use as condiments for pickling purposes. **William Henry Harris,** BM/HPGV, London, W.C.1; Pharmaceutical chemist.

CHEVRON.—739,479. Port wine and sherry wine. **Martinez Gassiot and Co., Ltd.,** 5, Fenchurch Street, London, E.C.3; Wine merchants.

CIRRUS.—740,145. Edible oils and edible fats. **The Globe Refining Co., Ltd.,** Eugene Street, Pennywell Road, St. Judes, Bristol; Manufacturers.

CLEREX.—738,981. Meat extracts, preserved, dried and cooked fruits, and vegetables; and jellies (for food), jams, edible oils and edible fats. **Molcarn, Ltd.,** 65 London Wall, London, E.C.2.

BATGER'S MUNCHIES. — B734,779. Non-medicated boiled sugar confectionery. **Batger and Co., Ltd.,** 566, Cable Street, Stepney, London, E.1; Manufacturers.

FIGGERROLL.—735,205. Bread rolls. **Whitworths Holdings, Ltd.,** Victoria Mills, London Road, Wellingborough, Northants; Manufacturers.

BIG BEN.—736,585. Non-medicated confectionery. **Charles Bond, Ltd.,** Carlyle Road, Bristol, 5; Manufacturers.

GRANOBISK.—737,868. Cereal preparations in biscuit form for human use. **Granose Foods, Ltd.,** Stanborough Park, Watford, Herts.; Manufacturers.

AMBER GLEN.—734,565. Butter. **Adams (Wholesale) Dairies, Ltd.,** Buxton Road, Leek, Staffs.; Importers, Blenders and Packers.

MINERVA.—737,428. Meat; poultry and game, none being live; and meat extracts, edible oils and edible fats. **Richard D. Dudley and Co., Ltd.,** 41, Eastcheap, London, E.C.3; Produce Importers.

WAYSIDE.—724,149. Edible oils and edible fats. **Benninga (Mitcham), Ltd.,** 33, Mortimer Road, Mitcham, Surrey; Manufacturers.

SNOWLAND.—B730,950. Canned vegetables, canned soups, canned meats, canned fish, canned fruits, canned milk, butter, margarine, edible lard, compound cooking fats, cheese, jams, eggs, and bacon. **Lovell and Christmas, Ltd.,** 12, West Smithfield, London, E.C.1; Merchants.

FLEUR DE LYS.—736,339. Marrons in syrup and marrons glacés. **Plantin Brothers, Ltd.,** 6, Laurence Pountney Hill, London, E.C.4; Merchants.

FAWN.—736,343. Edible oils, lard (for food) and margarine. **Griendt's Margarine Works and Oil Mills (U.K. Distributors), Co.,** 4, Dove Court, Old Jewry, London, E.C.2; Merchant.

Information and Advice

This Service is available to subscribers to Food Manufacture. If a stamped addressed envelope is enclosed replies will be sent by post, but enquiries cannot be answered by telephone.

Soluble coffee

B.7519. *We would like information on the manufacture of coffee extract.* (Dublin)

After the coffee has been roasted, it is coarsely ground and then extracted, hot water acting as the solvent, with a yield of anywhere from 22% to slightly more than 30% of soluble solids. Most manufacturers prefer a yield of about 25%. The concentrated coffee solution is put through either a vacuum drum or a spray drier; the latter is generally preferred. If soluble coffee product rather than soluble coffee is required, enough carbohydrate material is added to the concentrated solution to yield a final product containing not less than 50% coffee solids. The added carbohydrate material is often a special corn syrup which consists largely of maltose, dextrins and other material with a low degree of sweetness.

Spirit vinegar

B.7517. *Have you any information on the manufacture of spirit vinegar?* (Manchester)

Cane molasses are diluted to a suitable strength with water and then inoculated with yeast. The conditions are carefully controlled so that the yeast produces the maximum alcohol content and a minimum of unwanted products. The alcoholic liquid is then distilled, the alcohol thus being separated from unwanted and non-volatile residues. It should be noted that among other things this operation is responsible for the almost negligible soluble solids in spirit vinegar. The alcoholic distillate is then acetified by inoculation of acetic acid bacteria, and the vinegar so produced contains about 13% acetic acid, the highest concentration at which the bacteria will effect the conversion.

Prepared cake mix

B.7498. *We would like a recipe for a prepared cake mix which can be manufactured and sold to the baker, thus requiring a long shelf life.* (Glasgow)

The most important considerations for long shelf life in a cake mix are low moisture content in the flour used and a high quality shortening with a low free fatty acid content. The moisture content of the flour should be about 11%, and a hydrogenated shortening will have the best shelf life. The baking powder should be of the phosphate type and a pyrophosphate will probably give the best results.

Good quality milk powder and dried egg, both free from any strong flavour, should be used. Fine caster sugar (passing through a 30 B.S. sieve) is necessary, but too fine a grade will cause lumpiness due to caking and would produce a densely textured cake. On the other hand, sugar which is too coarse will not dissolve easily enough during the relatively short time that the mixture is being mixed with water, and the crystals will coarsen the crumb and bring out spots on the cake surface.

Colours and flavours are best sprayed into the mixing or added to the sugar first and then dispersed mechanically. The selection of the flour is most important. Today most people use the specially milled cake flours, either by themselves or in conjunction with soft National flours. Strong flours must be avoided, otherwise the cake will be tough and volume will be lost, since the aeration is produced entirely by baking powder. Australian flour is very suitable.

The following basic formula is suitable for a plain madeira type of cake. Sultanas and mixed fruit and various flavours can be added to produce varieties.

	lb.	*oz.*
Special cake flour	30	—
Soft National flour	3	—
Hydrogenated fat	22	8
Caster sugar	32	—
Salt	—	12
Baking powder (2:1)	—	15
Dried egg	6	—
Skim milk powder	2	8
Liquid egg colour	as required	

Mix the ingredients well and make up into 1 lb. packs so that to each pack 5 oz. of water would be added to make a cake batter.

Information supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery and materials, and also general information as follows:

B.7520. *Formulae for jujubes and skimmed milk powder tablets.* (Gwalior, India)

B.7521. *Information on infra-red in canning.* (Angola)

B.7522. *Makers of moisture meter.* (Calcutta)

B.7524. *Information on patent nut-shelling machine.* (Thadindong, Thailand)

B.7526. *Procedure for making peanut butter.* (Manchester)

B.7527. *Information on moisture meter.* (Mysore)

B.7528. *Advice on bottling cashew nut cream.* (Eastbourne)

B.7529. *Makers of T.T. milk tablets.* (Bangor)

B.7530. *Makers of vibratory feed weigher.* (Brooklyn, New York)

B.7531. *Formula for marshmallows using invert sugar.* (Slough)

B.7532. *Suppliers of antioxidants.* (Montreux, Switzerland)

B.7533. *Keeping quality of anchovy paste pie filling.* (Sao Paulo, Brazil)

B.7534. *Advice on making corn flakes, pineapple juice and starch.* (Kenya)

B.7535. *Suppliers of precipitated calcium carbonate.* (Haifa)

B.7536. *Suppliers of rubber slaughterhouse aprons.* (Hull)

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

732,153. R. W. Badner. Machines for assembling biscuits, wafers or the like for sandwiches.

732,240. Vickers Armstrong, Ltd. Machines for filling vessels such as bottles with liquid.

732,331. Gangloff et Cie. Basket for bottle washing machines and machines incorporating same.

732,434. T. Wall and Sons, Ltd. Frozen confections.

732,452. Gaskell and Chambers, Ltd. Beer or other liquid servicing machines.

732,498. K. A. Bownass. Conditioning of beer in casks.

732,542. J. Reynolds. Pourers for containers such as bottles.

732,543. W. and A. Gilbey, Ltd. Method for stabilising wine and other fermented liquors.

732,637. N.V. Maschinenfabriek Bolnes Voorheen J. H. van Cappellen. Plate heat exchangers.

732,770. General Package Corporation. Moulded paper pulp egg cartons.

732,837. Diamond State Food Products, Inc. Dry imitation vinegar.

732,889. W. Thyne, Ltd. Bottle and like carrier cartons.

732,897. T. Collins and Co., Ltd., and A. T. Collins. Food baking equipment.

732,908. Ecko Products Co. Baking form.

732,930. J. W. Gardner. Methods and machines for removing skins from nuts.

ABSTRACTS OF BRITISH PATENTS

Dough sheeting and curling apparatus

A continuous method of moulding loaves of bread dough consists of subjecting dough to a sheeting operation while it is being extruded. The still advancing sheeted dough is turned through an angle so that the protein strands extend transversely to the original line of movement, curled around a parallel axis. The dough is first pre-sheeted by compression, kneading and extrusion so as to convert it into a flat elongated strip. The principal function of the method is to knead the dough, expelling carbon dioxide from it and to develop the proper grain and texture in the loaf.—733,266. *F. F. Hansen.*

Apple base for thick sauces

Apple pomace is said to provide an inexpensive base for thick fruit sauces. It is cooked in an aqueous medium in the presence of an alkali until the tissue is softened and the pectic substances dissolved. The pulp is then disintegrated to form a stable suspension of the solids and acidified to reprecipitate the pectic substances in the interstices of the cellular mass.

In an example 1 cwt. of dried apple pomace is soaked in 200 gal. water and sodium carbonate is added to bring the *p*H to about 9. After soaking the mixture is boiled until the tissue becomes soft. It is then sieved to remove the hard tissue and the resulting pulp is acidified to about *p*H 4·5 by hydrochloric acid.

The acidified pulp is passed through a micro-disintegrator, reducing the particle size to such an extent that it will not separate from the liquid phase on standing. Thus the pulp remains homogeneous for a long period.—732,983. *William Evans and Co. (Hereford and Devon), Ltd.*

Packeting tea

Tea may be uniformly compacted into paper bags by this invention, which consists of a vertical feed duct with a slidable nozzle.

A rotary cam gives a jogging motion to the nozzle. The invention is suitable for filling other granulated or powdered materials into containers. — 731,744. *Autopack, Ltd.*

Sugar beet extraction

During the continuous extraction of sugar beet in a tower with an extraction liquid, the supply of fresh extraction liquid is regulated so that the liquid level in the tower remains constant. The withdrawal of raw juice is separately regulated so that the juice has a given concentration by controlling the relationship between the amount of material to be extracted supplied to the tower and the amount of liquid withdrawn. The raw juice withdrawn is controlled near the inlet of the extraction agent to the tower by a regulating valve connected to a float. —731,982. *Pfeifer and Langen Köln and Braunschweigische Maschinenbauanstalt.*

Potato crisp manufacture

Potatoes are placed in a container with a perforated bottom through which hot air is blown, thus driving off any moisture. When sufficiently dry the potatoes are fed down a trough, long enough to allow them to cool down, into a basket held in an electrically-heated vat containing boiling fat.

When cooked the potatoes are tipped from the basket on to a draining platform and stand until the surplus oil has drained away. They are then fed into a centrifugal extractor to remove any remaining fat.—731,555. *J. E. Cruickshank.*

Frozen confections

A method for making frozen confections without using moulds consists of feeding a plastic, partially frozen mix continuously to a discharge station and cutting successive portions of this mix from the continuously moving volume. These portions are deposited upon an endless flexible metallic carrier to which they adhere and the carrier is rocked back and forth over rotary supports until the confections have solidified.—731,749. *Eskimo Pie Corporation.*

ABSTRACTS OF FOREIGN PATENTS

Fermenting soya bean sauce

An aqueous solution (5 cu. m.) containing 1·2% amino acid, 400 kg. sodium chloride and 250 kg. glucose in a fermentation vessel is suspended with a basket containing 750 kg. of *Aspergillus*. The solution is fermented for a month with occasional shaking of the basket.—Japanese 3,249.

Diastatic malt flour

The residue from malt grinding—to which may be added the ground residues of unmalted cereals such as wheat, rye, corn or rice—is extracted with water at 20-60°. The extract is fermented with yeast and dried and the resulting dry yeast rich in vitamin B_1 is mixed with malt flour. A small amount of ascorbic acid is added to this to improve its baking properties. The vitamin content of the dry yeast can be enriched by adding synthetic aneurin or its components or vitamin containing yeast extracts to the original extract.—German 824,781. (Through *Chem. Abst.*)

Treatment of sugar solutions with ion exchangers

The last fractions of sugar molasses (beet molasses) passed through ion-exchangers are collected separately and used as a medium for aerated yeast production. The spent regenerants, especially if the anion - exchanger is regenerated with aqueous ammonia can be added as a source of mineral elements and nitrogen compounds. This separate use of the last fractions leaves the main part of the sugar liquors purer and with lower nitrogen content.—French 1,056,927. *N.V. Octrooien Maatschappij "Activit."*

Sour milk product

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Rennet manufacture

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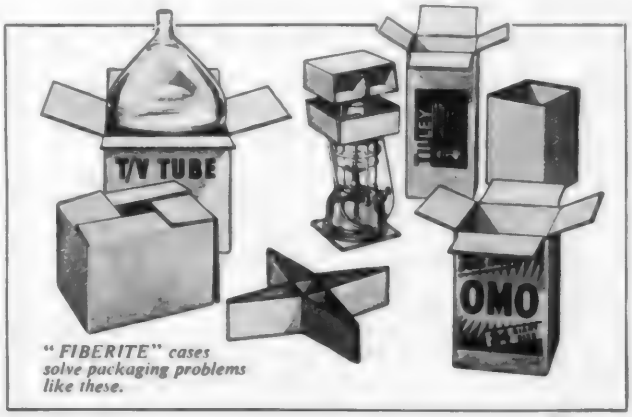

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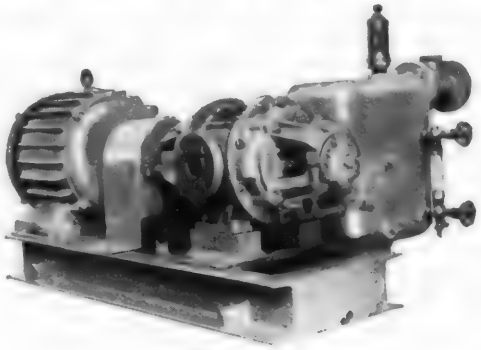

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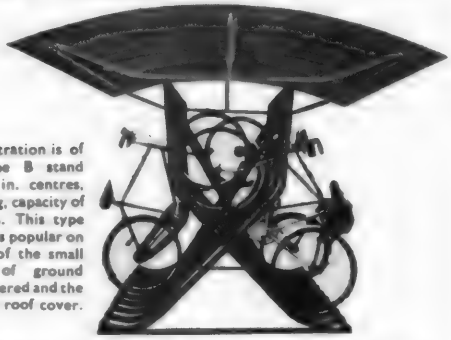

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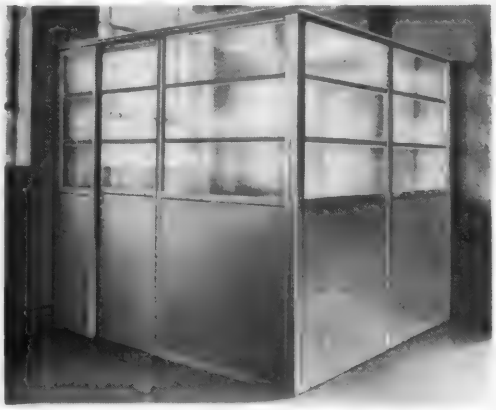

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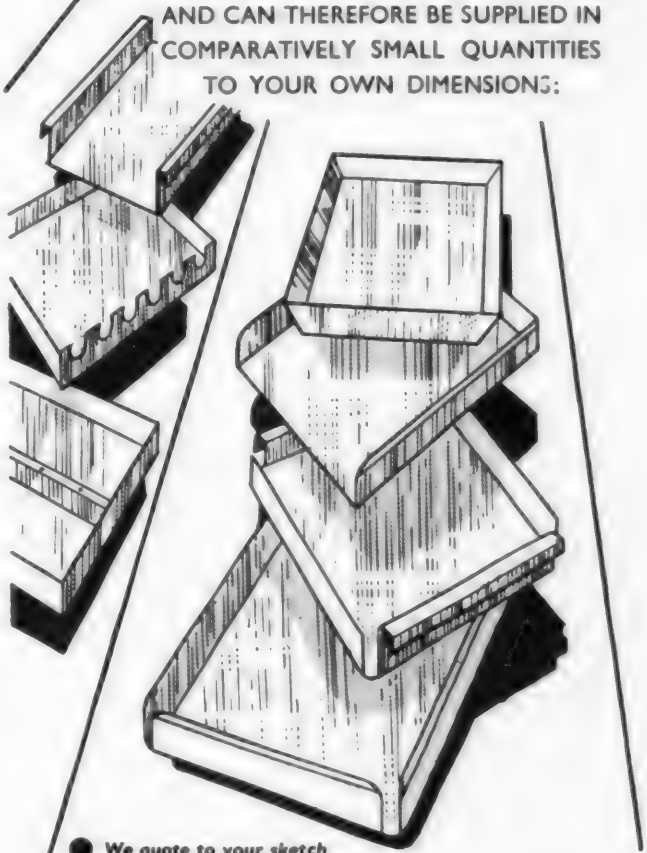

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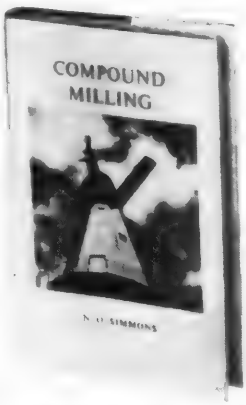

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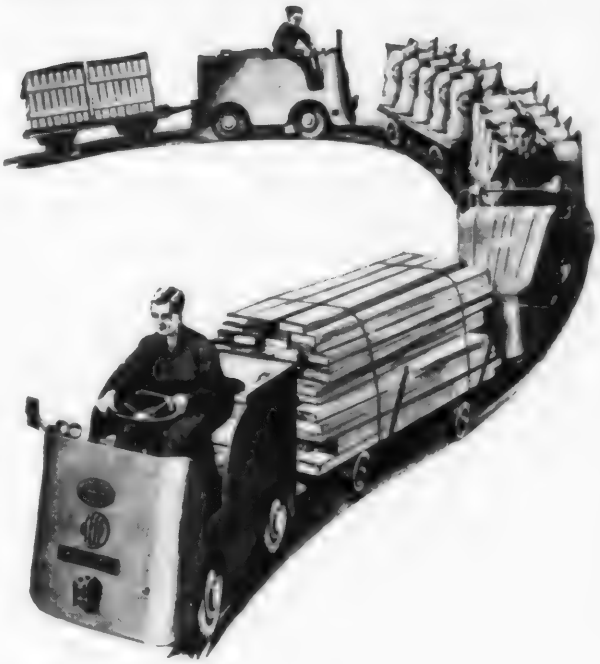

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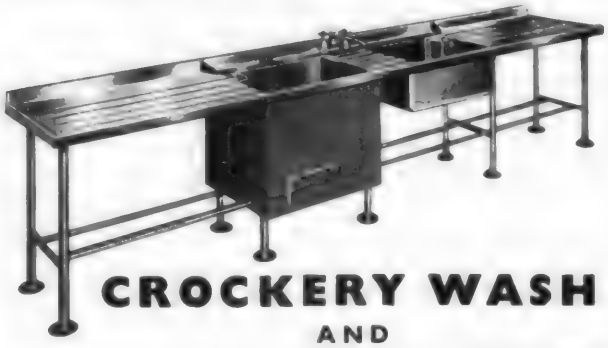

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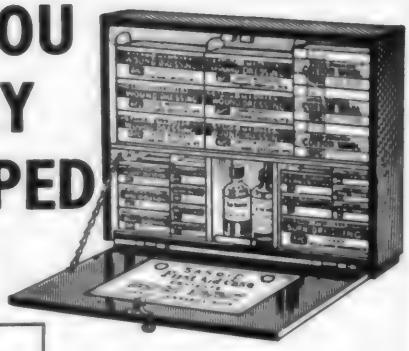

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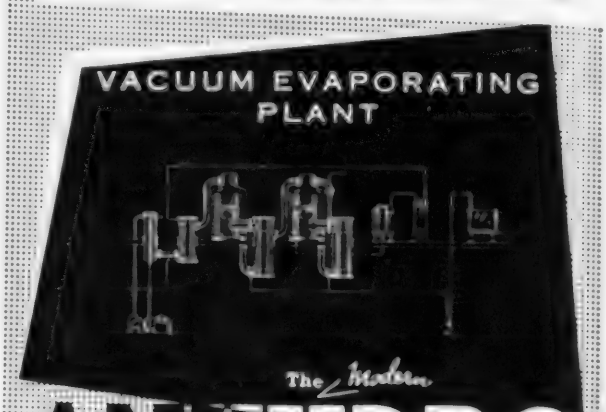

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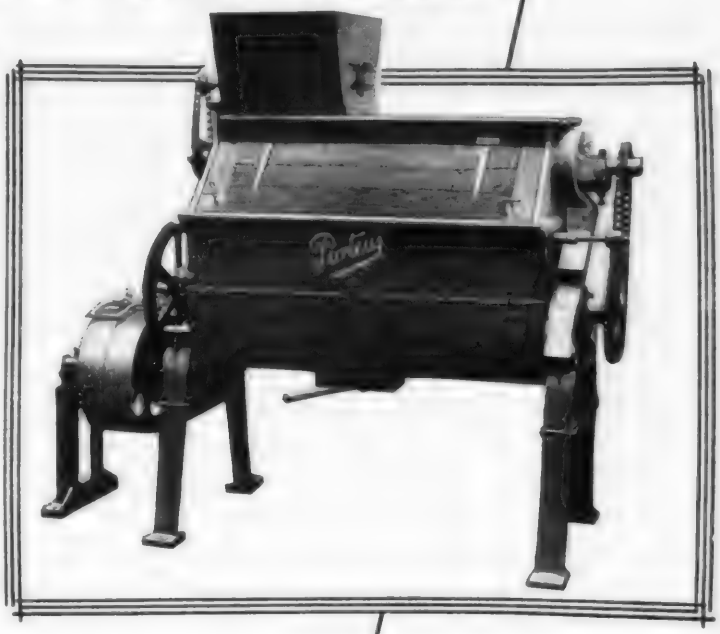

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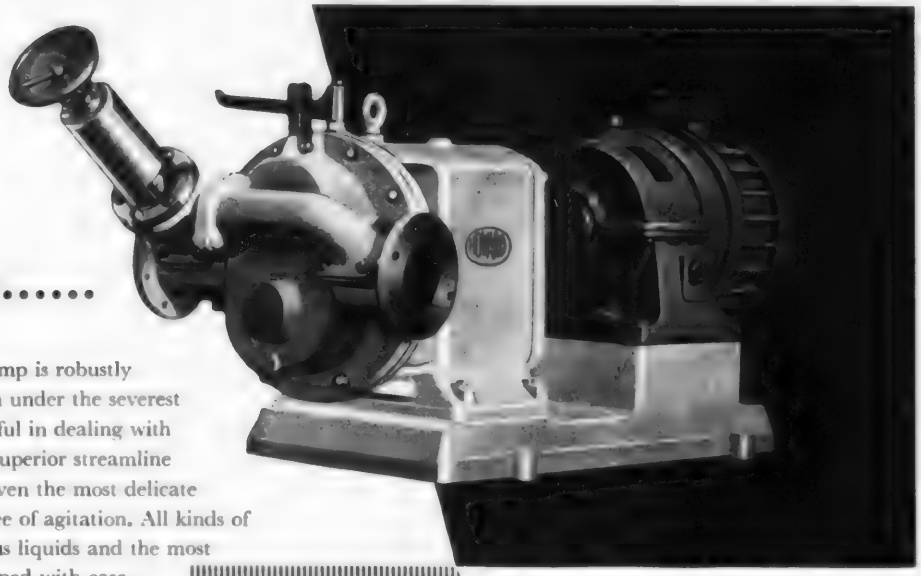

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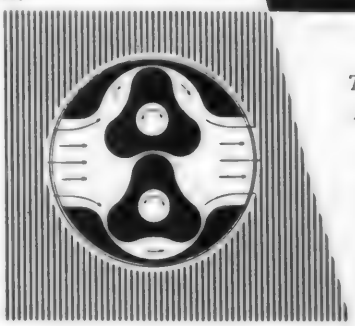

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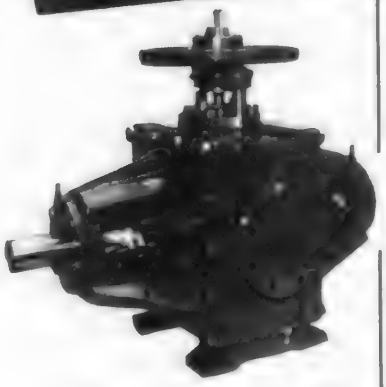

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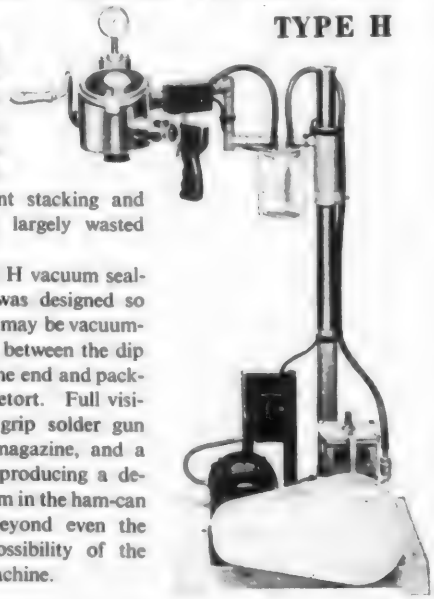

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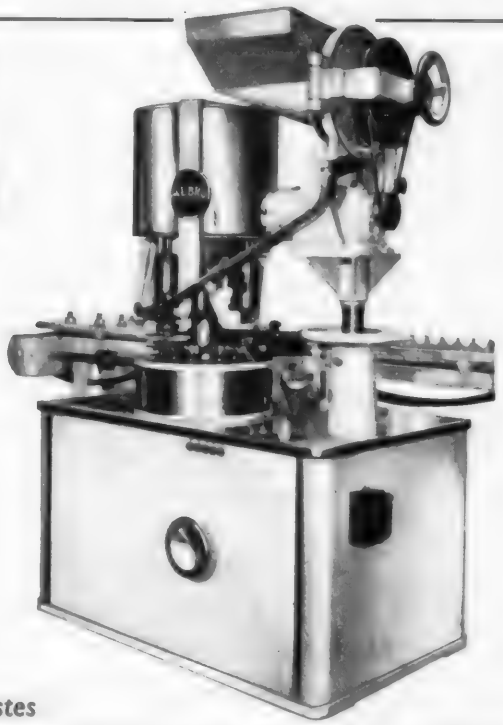

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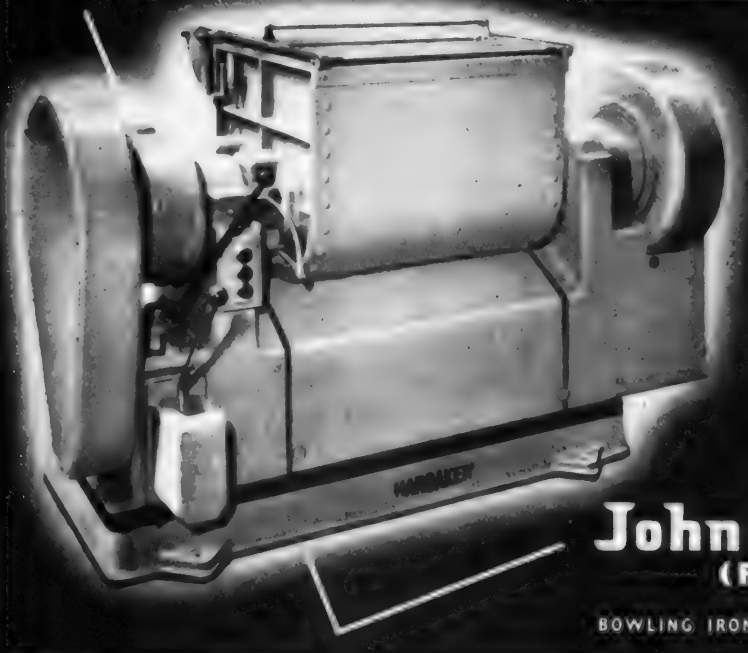

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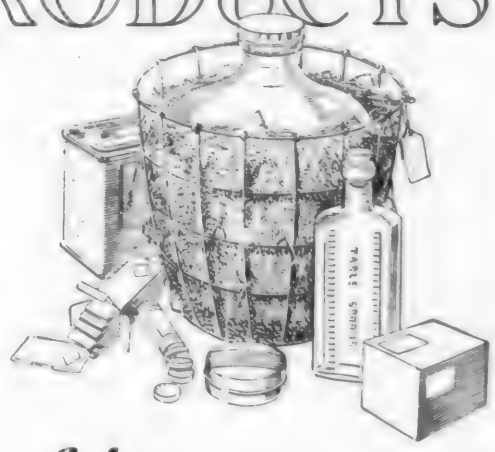

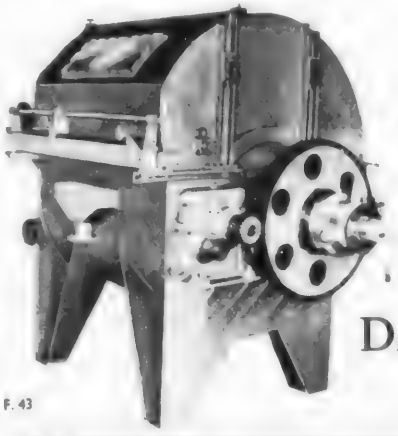

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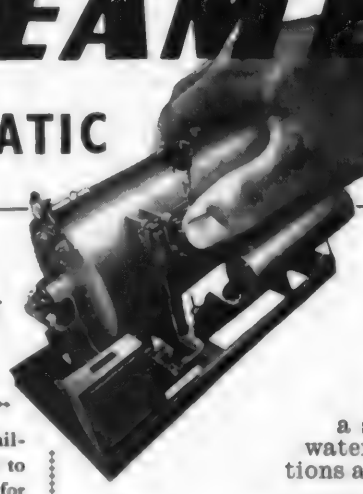

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REQUIRED by a leading chocolate and confectionery manufacturer in South Africa a qualified Chemist, aged between 30 and 40. Experience in one of the food trades would be of advantage. Candidate would be required to proceed to South Africa during the last quarter of 1955, after initial training in the UK., Commencing salary £1,500. Pension scheme and settling-in allowance.—Particulars in the first instance to Stephen, Fraser (London), Ltd., 2, Copthall Buildings, London, E.C.2.

IMMEDIATELY required by well-established manufacturers of flavouring compounds and fine chemicals, a person to actively partake in and take over the sales organisation. The provision offered is substantial, merit will quickly lead to the position of a senior directorship. Full information and details necessary. Applications will be treated in confidence —Apply Box B5064.

CHEMIST required by London food manufacturers of highest repute for analyses of varied character in the Control and Analytical Laboratories. A young graduate with possibly some experience in this or a related branch of industry would be suitable. Five-day week, pension fund with life assurance, social club and staff dining room. Salary will be commensurate with ability and aptitude. —Box B5036.

PROCESSOR with knowledge of Laboratory work essential for Fruit and Vegetable Canning Factory in East Anglia. Applicants to state experience and salary required.—Write Box B5011.

QUALIFIED Chief Chemist required by progressive Company canning fruit and vegetables. Experience in Quality Control essential. Knowledge of Fruit Juice production an asset but not essential. Excellent prospects for first-class man. Pension scheme.—Full details experience, qualifications and salary range in strict confidence to Box B5032.

AN excellent opportunity for a young man educated to inter B.Sc. standard to be trained with a view to taking over a Department manufacturing and bottling Fruit Juices. A practical and mechanical applicant is essential, together with the ability to control labour. Good prospects for the right man.—Apply in strict confidence, stating age, experience and salary range to Box B5056.

FOOD BUYER

An experienced buyer is required by a Company of food manufacturers with a national distribution. Applicants must have had experience of buying raw materials in the food or grocery trades. Ability to control stock and staff is also necessary Salary up to £1,500 per annum. Superannuation Scheme. Applicants should reply giving full particulars to Box H96 Lee & Nightingale, Liverpool.

SITUATIONS VACANT

A South Australian

FRUIT AND VEGETABLE CANNERY

offers permanent and lucrative employment for an experienced

ASSISTANT PRODUCTION MANAGER

The successful applicant and his family will be nominated by the Company and an attractive residence made available at a reasonable rental on arrival. The Company's Managing Director at present visiting England will personally interview suitable applicants during first two weeks of August. Apply giving fullest details to Box B5061.

EXPERIENCED JAM MAKERS

interested in securing a highly paid position in a SOUTH AUSTRALIAN CANNERY are invited to make immediate application. Successful applicant and his family will be nominated by the Company and a suitable residence at a reasonable rental will be available on arrival. Suitable applicants will be interviewed in London the first two weeks in August. Apply giving fullest details to Box B5062.

MANAGER required for Fruit and Vegetable Canning Factory in Midlands. Applicants must possess a sound knowledge of Canning and factory management.—Write stating age, experience and salary required to Box B5055.

REPRESENTATIVE with first-class connections, food, ice cream, confectionery manufacturers, to sell Essential Oils, Gums, Flavourings, Spices and various raw materials.—Box B5069.

A Modern, progressive manufacturing company situated in a pleasant, rural part of the Midlands invites applications for the important post of Shift Maintenance Supervisor. This is a management appointment and carries a four-figure salary. Applications are invited from engineers who have served full apprenticeships and have reached either degree or National Certificate standard. Working conditions are good and the company offers such benefits as life assurance, non-contributory pension, etc.—Applications giving details of experience and education to Personnel Officer, Box B5037.

SITUATIONS WANTED

JAM Trade. Thirty years practical experience Jams, Jellies, Marmalade, Lemon Curd, Piping Jelly, Mincemeat, Fruit Pulping, used to control of labour with chemical knowledge of the trade. Desires change. Age 46—Box B5053.

FOOD Chemist seeks responsible position at Executive level. Wide experience in all branches of Food Trades, Analysis, Microbiology, Laboratory Control, Factory Management and Process Developing. Age 40 years. —Box B5051.

GENERAL and Sales Manager open to consider proposition offering expansionist and creative work with scope and responsibility and, desirably, prospect of directorship; any field, though hitherto food. Comprehensive trading, administrative, sales-management (and some foreign) experience covering 18 years. Age 45.—Box B5050.

A.M.I.Struct.E., 45, wide experience in acid, and heat resisting constructions of brick, steel, reinforced concrete, foundations, etc., seeks position as Works Engineer with firm contemplating extensions.—Box B5035.

JAM, Marmalade, Lemon Curd, etc. Practical man is seeking responsible position where keenness and energy are required. Many years experience in management and buying. —Box B5070.

BUSINESS OPPORTUNITIES

ROTHESAY (West Scotland). Substantial brick building for sale; 5,000 sq. ft.; electricity (power and light), gas and water laid on; ideal factory. Very low price.—Box B5063.

FOR SALE: Factory with Canning facilities, south coast, town centre. 3,000 sq. ft. Leasehold. Fixed assets, £1,250. Price £1,750 for all including goodwill. Owner emigrating.—Box B5065.

EXTRUSIONS BY MARLEY

Buyers requiring rigid and flexible tubes and sections in thermoplastic materials should ask for a quotation from Marley Extrusions Ltd., Dept. 147 Lenham, Maidstone Kent. Harrietsham 381.

MANUFACTURERS and Investors. Why not establish a Branch in the Republic of Ireland where strikes are almost unknown and labour is plentiful? Write us your requirements in the matter of factory premises and/or sites.—Grew's Estates Ltd., 54, Dawson Street, Dublin. Tel.: 77003/4. Telegrams: "Grew, Dublin".

IMPORTERS interested in Shelled Prawn, boiled as well as dry salted; Prawn Chutney; Mango Pulp in brine; Mango Chutney; Puppodums; Madras Curry Powder; fresh peeled and sliced Ginger preserved in brine and vinegar packed in teakwood barrels; and general produce from Southern India.—Apply to Eastern Produce Trading Co., P.O. Box 17, G.P.O., Madras.

DE-GREASING and Cleaning Down! One man can do the work of five with B. and A steam-cleaning-with-detergent equipment; ready for use from your own steam supply. "Speedylectric" high-efficiency steam lance; 30 ft. steam hose; 15 ft. detergent hose; £40 complete. Ideal for the Food industry.—Bastian and Allen Ltd., Leaflet L.30, Ferndale Terrace, Harrow, Middlesex.

WELL-KNOWN Scottish Pie Makers can offer attractive terms to Agents with own transport. Goods despatched to any part of the country by passenger train. Branded line, goods packed in cardboard cartons, each containing one dozen.—Trade inquiries to V. C. Pies Ltd. Glasgow. Tel.: Maryhill 1048.

FULL Steam in five minutes with B. and A. Electrode Boilers, used by British industries for twenty years. No boilerhouse, no flue, no attendant needed. The most compact and convenient steam raisers available, can go beside machines using the steam.—Write for leaflet 125, Bastian and Allen Ltd., Ferndale Terrace, Harrow, Middlesex.

COPPER Tubing, 99 lengths by 16 ft. solid drawn. 1⅛ I.D., 1⅜ O.D. Second-hand, in nice condition. 15s. per foot, ex works.—Warrington Canners Ltd., Riverside Works, Penketh, Warrington.

RECONDITIONED ex-Army Huts and Manufactured Buildings, Timber, Asbestos, Nissen type, Hall type, etc. All sizes and prices.—Write, call or telephone, Universal Supplies (Belvedere) Ltd., Crabtree Manorway, Belvedere, Kent. Tel.: Erith 2948.

CARROTS. Company with large tonnage this year would pack for Veg. Canning Co., any size up to A.2½. Fully automatic.—Box B5067.

NEW ZEALAND

manufacturer at present in England wishes to contact foodstuffs manufacturers interested in the packing and sale of their lines in New Zealand. Goods could be packed on a royalty basis. All replies in strictest confidence to:

Foodstuffs,
National Bank of New Zealand,
14, Charles II Street,
London, S.W.1.

BUSINESS OPPORTUNITIES

CHELSEA Polytechnic, Manresa Road, S.W.3. (Department of Botany and Zoology.) (*a*) Courses in general and advanced Microbiology will be given during the session 1955-56, starting on September 26, 1955. (*b*) A course of lectures, with appropriate practical work, on *Metabolism of Microorganisms* will be given on Tuesdays from 6-9 p.m., beginning September 27, 1955. Tuition fees (if London students): Course A (September to June) 30s. (first year); 35s. (second year). Course B (October to Easter) 40s.—Intending students should apply by letter to the Head of the Department of Botany and Zoology, Chelsea Polytechnic, Manresa Road, S.W.3, not later than August 31, 1955. Enrolment September 21, 6-7.30 p.m.

THE Proprietors of British Patents Nos. 669,428 for *Improvements in Food Mashers*, and 669,440 for *Improvements in Food Shredding or Mashing Devices*, desire to enter into negotiations with a firm or firms for the sale of the patents, or for the grant of licences thereunder.—Further particulars may be obtained from Marks and Clerk, 57 and 58, Lincoln's Inn Fields, London, W.C.2.

SWEDISH Food Manufacturer of old standing desires extending production programme, is willing to discuss new lines either as wholesale distributor or manufacturing on licence base.—Box B5034.

FIRM with Modern Plant has Spray Drying Capacity available.—Box B5039.

EASTBOURNE Canning Company has capacity of 1 ton per week free. Bottling also considered. Offers from importers with bulk stocks invited.—Enquiries in strict confidence to Box B5041.

FRUIT Canning. Small Company, showing Tax Loss, for sale or amalgamation. No plant, premises. Excellent brand name, £2,500.—Box B5042.

NATIONAL College of Food Technology, Cranwood Street, City Road, London, E.C.1. *Food Manufacturers' Federation Scholarships.* The Food Manufacturers' Federation Incorporated will shortly proceed to award the undermentioned Scholarships, tenable at the above College for the Session beginning October 3, 1955. The Scholarships are open to those already employed in the food industry and to those who wish to enter it. The Committee will base their selection of suitable candidates on the results of interviews. Prospects of employment are good in the industry: more technologists are required than are yet available.

(1) *Postgraduate Courses.* One Scholarship to the value of £360 to the holder of a suitable science degree or an equivalent qualification. The Scholarship, to be called the Food Manufacturers' Federation Postgraduate Scholarship, is intended to meet the cost of maintenance and the tuition fee of £60 for one session. The course available are in General Food Technology, Food Microbiology and Food Quality Control.

(2) *General Food Technology Course.* Two Scholarships, each of the value of £320 per annum, to meet the cost of maintenance and tuition fees (£60 p.a.) for two years. Applicants should be not less than 18 years of age and should have reached the educational standard of the General Certificate of Education at the Ordinary level in at least four subjects, which should include English and mathematics, and at the Advanced level in at least one science subject, such as chemistry, physics or biology.

Full particulars of the courses can be obtained from the College. Scholarship application forms (obtainable from the Registrar) to be returned to the Principal as soon as possible.

FOR SALE: A small Fruit and Vegetable Cannery in fruit-growing area. Living accommodation, excellent labour.—Box B5047.

JAMS, Marmalade, Lemon Curd and Fruit Squash Business. Clean and well-equipped factory. Three boiling pans, mincer, mixer, labellers, syrup mixing pan, squash agitator, electrode steam boiler, etc. Two lorries and one 10-cwt. van. Office accommodation adjoining premises. Ground-floor area of factory, 2,270 sq. ft.; first floor, 1,760 sq. ft. Freehold property. Midlands district.—Box B5060.

PLANT FOR SALE

SMALL complete Jam Manufacturing Unit, consisting of electrode steam boiler, three boiling pans complete with all pipe lines and fittings, rotary filling table, labeller, pulping, cutting, mixing and whipping machines, scales, water softener pans, laboratory equipment. Can be seen any time. Also freehold factory and offices if required. Midlands area.—B5059.

TWO Lehmann four-pot conches, nominal 1-ton total capacity, complete with motor in good working condition for sale; also Elite five steel roller refiner in good condition, complete with motor.—Offers to O.P. Chocolate Specialities (Mfrs.), Ltd., Merthyr Tydfil, Glam.

AVERY Platform Dial Scale, 65 lb., overhauled and in new condition, little used. £45 o.n.o.—Box B5043.

GARDNER Sifter and Mixer, 5 cwt., size H, in good order. Also one D size, 100 lb. capacity.—Frank Stacey and Co. Ltd., Vauxhall Street, Birmingham, 4.

JACKETED Mixer, 15 gall. capacity, D/A stirrers. Tilting worm gear. £142. Small laboratory jacketed Mixer. Copper inner, 9 in. by 5 in. deep, with mixing apparatus. New and unused. £20, cost £40.—Box B5005.

TWO twin-head vacuum Bottle Fillers (Bancroft) complete with motors, receptacles, etc., almost unused. £80.—Box B5030.

SECOND-HAND PLANT WANTED

WANTED: Automatic bagging, weighing, filling, cartoning plant complete, or separate units. Also grinding, sifting and mixing plant.—Box B5058.

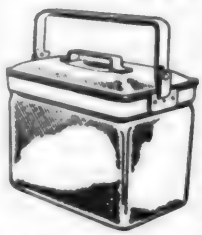
PASTEURISER. Continuous type machine required for bottled goods. Capacity 300 dozen per hour. Pasteurising zone temperature 140/150°F. Time 35 minutes.—Box B5044.

REQUIRED in good condition Purdy Unimatic Labelling Machine—alternative make would be considered—capable of labelling 2-oz. tapered jar at a rate of 70/80 jars per minute.—Box B5033.

GARDNER type Sifter and Mixer, 5 cwt. capacity, required.—Box B5066.

WANTED urgently: 15 cwt. capacity steam jacketed Trough Mixer, Gardner or similar.—Reply to Box B5071.

STAINLESS STEEL VESSELS



50/- each carriage paid in dozens

55/- each plus 2/6 carriage and packing smaller numbers.

Capacity 6 gallons.

16" × 11" × 11" deep.

Complete with lid as illustrated plus inner anti-splash lid. Handle swivels flat thus securing lids when in transit.

Ex M.O.S. constructed to usual high government specification.

Radius corners, 20 gauge 18/8 stainless steel, every vessel despatched in sound serviceable condition.

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MISCELLANEOUS WANTS

WANTED: Surplus Stocks of Jelly Cartons. Disused Brands. Large quantities.—Write: Angel Food Products, 74, Upper Street, London, N.1.

DAMAGED or redundant stocks of food, residues or by-products in large or small quantities required.—Send your offers to Rotunda Foods Co., London Office: 50/52, Blandford Street, W.1. Tel.: Welbeck 8465.

SECOND-HAND Tins. Large quantities of ex M/F Frozen Whole Egg type tins wanted weekly. Size 12 in. by 6 in. by 6 in.—Warrington Canners Ltd., Penketh, Nr. Warrington.

MEDICAL bottles; tablet bottles; jars; bottle closures, bakelite and metal purchased. Best prices paid.—Samples and full details in first instance to Noel Davold and Co., 9, Laurence Pountney Lane, Cannon Street, London, E.C.4. Tel.: MANsion House 3951-2.

The Strongest Vanilla Flavour

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1 oz. (2/6) makes a pint of essence
4 ozs. 8/6. ½ lb. 16/6. 1 lb. 32/-

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30 Church St., Newton Heath, Manchester, 10

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SECOND-HAND PLANT FOR SALE

GARDNER Sifter and Mixer, 5 cwt., size H, in good order.—Frank Stacey and Co. Ltd., Vauxhall Street, Birmingham, 4.

BOWYERS (Wiltshire Bacon) Ltd., Trowbridge, Wilts. A Harrison Carter Bone and Cake Meal Grinding and Sifting Plant, size "00," at present producing 4 cwt. per hour. In good order, can be seen working. Reason for sale, too small for present output.

THREE Peach Slicers for cutting halved peaches into six segments. Capacity 10 cwt. per hour. Each complete with motors. One Pea/Bean filler. M. and P. 5-head type with Tall 1, A2, 2½, change parts. Capacity up to 90 cans per minute. Belt drive. Four Runner Bean Slicers. M. and P. 6-head type. Oblique cut. Capacity 8-12 cwt. per hour each. Belt drive. Pea Washing Machines. Two Olneys. Five Duo types. Belt drive. Five Vertical Retorts. Three-crate model. 10 lb. working pressure. One Bliss Seamer, type 712. A10's and under. Belt drive. Two Hammermac Grinding Mills, size 3SS. Electric motor, E.E.C., 35 h.p., 960 r.p.m., slip ring with starter. E.E.C., 25 h.p., 1,440 r.p.m., slip ring with starter. G.E.C., 25 h.p., 950 r.p.m., slip ring with starter. G.E.C., 20 h.p., 1,420 r.p.m., slip ring with starter.—Smedley's Ltd. Wisbech.

MISCELLANEOUS SALES

SODIUM Alginate, Lecithin, stocks held by direct importers.—L. E. Pritchitt and Co. Ltd., Hatch End, Middx. Tel.: Hatch End 2334.

FOR SALE: About 18 cwt. broken Gorgona Anchovies in salt suitable for fish paste or essence of Anchovy. No reasonable offer refused.—Box B5046.

FOR SALE: Surplus Packing Stock. Corrugated Cartons, 17¾ in. by 13⅛ in. by 7 in.; white glazed boxes, 6⅛ in. by 6⅛ in. by 2½ in.; 4-oz. grease-proof bags. Waxed-proof sheets suitable for Jelly wrapping. Also surplus plant.—Particulars from Famor Food Products Ltd., Santry, Dublin.

HAND TRUCKS, tubular steel, remarkably light and strong. Pneumatic tyres. Roller bearing wheels. Platform, 5 ft. 4 in. by 2 ft. 9 in. Carrying capacity 10 cwt. £14 2s. 6d. Immediate delivery. Write for illustrated catalogue.—Sterling Pump Co. Ltd., Spalding. Tel.: 2404.

ESTABLISHED manufacturers invite enquiries for genuine Worcestershire Sauce at 13/6 gall., ex works.—Tamar Indien, Harders Road, Peckham, S.E. 15.

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FOOD Processing Machinery. Copper boiling pans, etc.—Full details on request to Colonial Development Corporation, 33, Hill Street, London, W.1.

TWO excellent Gardner 5-cwt. size Combined Sifting and Mixing Machines, and one 3-cwt. size. One revolving drum-type Horizontal Mixer, 3 ft. 9 in. long, 6 ft. 4 in. diam., and 7 h.p. A.C. motor. Can be used for tea, dry powders, granular materials, seeds, etc.,—Frank Stacey and Co. Ltd., Vauxhall Street, Birmingham, 4.

600

FIVE new Twin Roll Spray Driers. Chilled c.i. rolls, 40 in. long by 32 in. diam., 74 lb. sq. in w.p., fitted air-cooled doctor blades rotary disc distribution trough, air-spray jets and worm discharge conveyors. Fitted stainless steel feed pump, jacketed feed tank and powder dresser.

Horizontal steam jacketed Drier by Parsburg, 23 ft. by 4 ft. diam. Fitted revolving reel of ten 4-in. diam. tubes around central tube, steam heated. Intermediate paddles for agitation. Jacket, w.p. 2 ats. With condenser, wet vacuum pump and fittings.

Rotary Drier by Vernon, Paris, 30 ft. by 4 ft. diam. of ⅜ in. riveted m.s. plate, running on two roller paths. Motorised through girth, gear and pinion. Fan, cyclone and furnace parts available.

Three new Vacuum Drying Ovens, welded m.s. construction, 7 ft. long by 42 in. wide by 42 in. deep, fitted nine steam-heated shelves to carry 36 acid-resisting trays, 36 in. by 16 in. by 1½ in. Davit-swung door each end, hand-wheel closing. Motorised horizontal wet vacuum pump, gauges, metal trays, etc.

Single Trough Mixer by Baker Perkins, 10 cwt., 6 ft. 1 in. by 28 in. by 29 in. deep, m.s. construction. Broken scroll agitator, motorised 400/3/50. Trough and agitator tinned.

Trough Mixer by Werner Pfleiderer, twin Z blades. Trough 2 ft. 8 in. by 2 ft. 8 in. by 2 ft. 2 in. Hand tilting.

80-qt. Peerless Mixer, four-speed type with sun and planet-type agitator, 400/3/50. Fitted whisk and 80- and 50-qt. bowls.

Automatic Bottle Labelling Machine by Peters, Slough. Capacity bottles up to 10 in. high, singly 4 in. wide, in pairs 2 in.; 60 per min. singly, 120 per min. pairs. Motorised 400/3/50.

Automatic Capping Machine by Peters, Slough. Suitable for pre-screwed caps and bottles or jars. Capacity 200/300 per min. Sizes 2½ in. to 10 in. high by 4 in. diam. Motorised 400/3/50.

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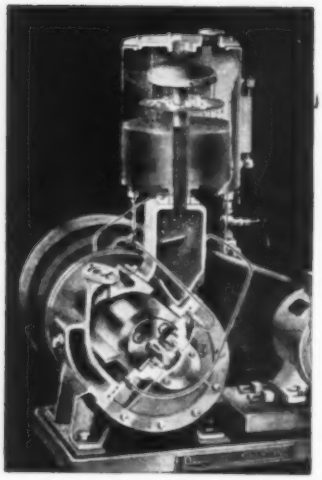

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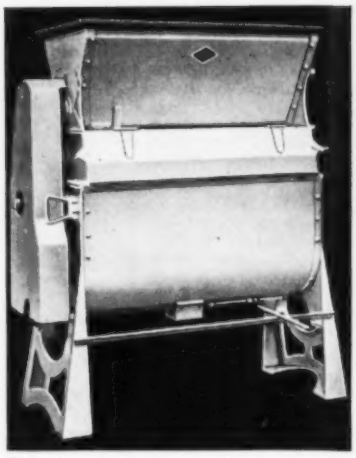

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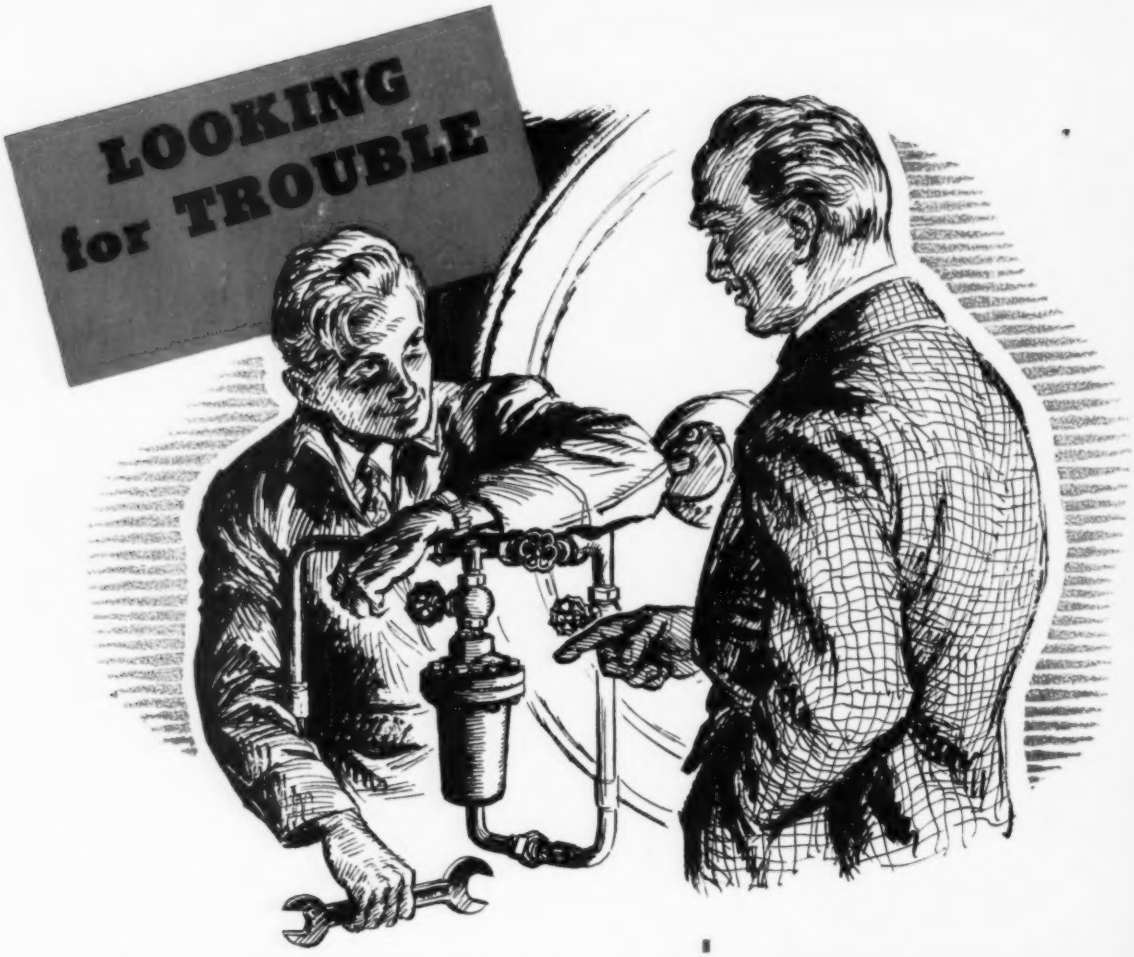

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"*That's so, Son.*"

"Well, how come the mills don't have any trouble?"

"*Trouble isn't there only when you know it. A trap can eat up steam* **before** *the condensate return system breaks down. Waterlogging can* **lose** *a whale of production if you don't realise proper drainage gives you* **more** *production. An engineer doesn't* **have** *to keep track of his spares costs unless the buyer kicks. A Chief Engineer doesn't* **have** *to know just how much time his fitters put in fiddling the traps.*"

"*To know if you've got trap trouble you have to go and look for it. But it pays. Our Drayton Armstrongs cost us round about 9d. a year for maintenance all in, and a lot of our traps are 15 years old.*"

TYPICAL 'NO-TROUBLE' CASE

(at a Midlands Hospital)

DAILY CALL SHEET 7/1/55. . . . Had interview with Mr. P. He considers that the traps he has installed are working very well. I did note on leaving his office that the trap fitted to the office radiator was blowing live steam.

TYPICAL DRAYTON INSTALLATION

(a firm of dyers in E. Anglia)

"While sending you an order for more of your Bucket Traps, we feel impelled to tell you what excellent service we have always had from these marvellous little Traps. It is literally true that one can fit one of these Traps and then forget all about it. The saving in cost of spare parts so frequently fitted to other makes of Trap must be considerable."
(Director)

DRAYTON
STEAM TRAPS

DA 43

THE DRAYTON REGULATOR & INSTRUMENT CO. LTD., WEST DRAYTON, MIDDLESEX. *(West Drayton 2611)*

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